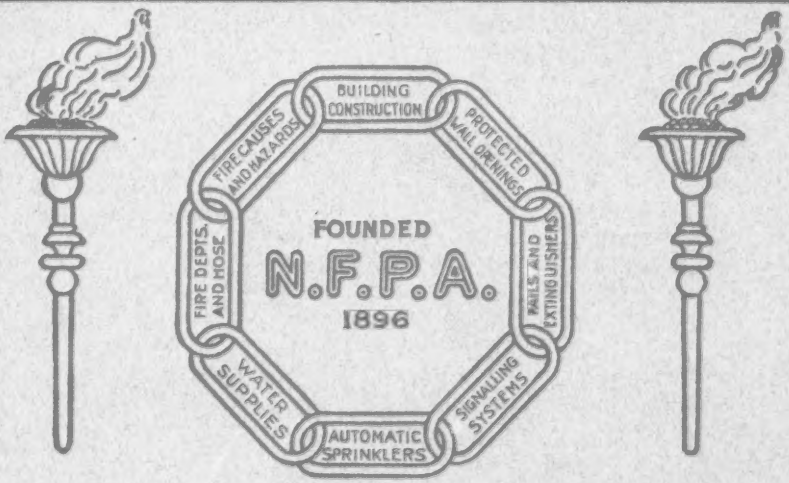
Vol. 29 APRIL, 1936 No. 4

QUARTERLY
OF THE

NATIONAL FIRE PROTECTION ASSOCIATION



"To Promote the Science and Improve the Methods of Fire Protection and Prevention."

PUBLISHED QUARTERLY AT BOSTON, MASS., BY THE
NATIONAL FIRE PROTECTION ASSOCIATION

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Vol. 29 April, 1936 No. 4

QUARTERLY

OF THE

National Fire Protection Association

Subscriptions are accepted only from members of the Association and are charged as a part of the annual dues. Membership is open to anyone interested.

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National Fire Protection Association

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International.

A burning oil plant, in Pittsburgh, surrounded by the water of the March flood. After this picture was taken the fire spread to other buildings. With buildings inaccessible for fire fighting, and with municipal water supplies out of service, the fire departments were at a great handicap in the flooded areas.

The Quarterly

Vol. 29 April, 1936 No. 4

Fire and Flood. No small part of the enormous loss suffered by the eastern states in the floods of March, 1936, was due to fire, and impairments of public and private fire protection. A number of serious fires were reported in the flooded areas, where rising waters made access by fire departments impossible, or where water supplies failed. During the flood period greater values were without adequate fire protection than during any previous period in the history of the country, and it is fortunate that the actual losses were not greater. The various emergency measures taken by fire protection authorities, and the well-known fact that few fires occur during periods when the public knows that public fire protection is impaired, were probably responsible for the avoidance of much greater losses.

It is too early at this writing to appraise the full effect of the floods, but it seems probable that impairments in water supplies and other fire protection facilities, and various indirect consequences of the floods, may affect the fire situation for some time to come. The general discussion of this subject, scheduled for the Annual Meeting of the Association in Atlantic City in May, should bring out all the highlights of the situation, and the report of these discussions as published in the Proceedings should furnish a permanent record of the relationship of flood and fire, valuable in devising means for meeting similar emergencies in the future.

* * * * * *

Warfare by Fire. The January issue of the *Independent Journal* of Columbia University has an article by a professor of chemistry which should have been on the desks of the members of the House of Representatives when on February 14 they appropriated $376,000,000 for the army, the largest appropriation ever made for this purpose in peace time. Of this large sum, $8,500,000 was for sea-coast defense projects. It seems probable that Congress will vote nearly $600,000,000 for the navy, bringing total military appropriations to about a billion dollars for the coming year—as compared with $540,000,000 in 1934. Despite a widespread demand for a balancing of the budget no business organization appears to have protested against

these military expenditures which will absorb about a quarter of the regular budget.

To Professor Zanetti, who in the great war was a Lt. Colonel in the Chemical Warfare Service, and so should know what he is talking about, this panic of Congress to spend all the money we've got left on the old lines of national defense must seem a good deal like building a picket fence to keep out smallpox. He says when the armistice was signed the French found in German ammunition depots an enormous number of small aerial bombs weighing only about two pounds. Examination showed that they contained thermite, which would be ignited on striking and produce an intensely hot blaze. General Ludendorff's *memoirs,* published in 1919, explained that these small bombs were intended to set London and Paris on fire, but were not ready for distribution until late August, 1918, and by that time the German situation was so hopeless that they decided not to employ them. They figured peace terms would be harder if the two capitals were in ruins.

These small bombs might appear ridiculous, considering the tons of gas required to produce lethal concentrations; but remember the difference, says Prof. Zanetti: gas *dissipates* while fire *propagates!* Each of these small bombs held within it the devastating possibilities of Mrs. O'Leary's cow.

"Such small incendiary bombs," says Professor Zanetti, "almost noiseless in their operation, are particularly fitted to airplane raiding. They do not have to be aimed; they can be scattered over the area attacked. A single two-ton bomber could carry nearly 2000 of them. In fact, a bomber is not needed; they could be dropped by any plane. The greater the urban areas in which population and wealth are concentrated, goods and staples warehoused, the greater the risk of staggering losses by conflagration, which no retaliatory devastation, no land or sea victories, can ever compensate."

Any of us who has witnessed the spreading of a conflagration by wooden shingle roofs can visualize the even worse result of the starting of numerous fires at once by such bombs as these. Perhaps after the next war, following our usual custom of using hindsight instead of foresight, we shall be hammering at Congress to appropriate billions for steel roofs, metal window frames and wired glass and automatic sprinkler systems.

* * * * * *

Fire Service to Neighbors. The impairment of city budgets during the present widespread effort of municipalities to reduce their operating expenses, has caused fire departments to look more sharply after their revenues as well as their expenditures. Many departments in years past have been very generous in responding without charge to fires in the fringe of residences commonly found just beyond the city limits. The city departments have no legal obligations to extinguish such fires in adjoining

towns or townships, and there has always existed the question of liability for accidents to firemen while operating outside the city within which such liability is covered. As suburban villages develop they create their own departments, usually of the volunteer sort, and some of them possess very modern apparatus. There is a period, however, in which these villages are too sparsely settled to finance such an organization and so seek help from the cities they border. As the fire calls increase, the city officials begin to realize they should not furnish this service perpetually without charge and seek methods of obtaining compensation for it. A common plan is that in operation in St. Paul, Minn., where the surrounding communities are now being assessed at the rate of $50 for the first hour, and $25 for every additional hour or fraction thereof for each piece of St. Paul fire apparatus called for.

There is a psychological advantage in this method of charging for service, over that of a fixed sum per year. It stimulates fire prevention consciousness and education among the outlanders to know they will have to pay in direct proportion to the amount of assistance they receive.

* * * * * *

Home Fire Drills. Statistics in the last issue of the QUARTERLY reveal that fires in dwellings, urban and rural, take a toll of human life strikingly in excess of other occupancies. The life losses of women and children are greatest in home fires, as may be expected. The fire prevention committee of the Lakewood, Ohio, Chamber of Commerce, recognizing this situation, has been experimenting with the idea of home fire drills, urging the families to consider what they would do in case of fire.

So much depends on the character of the building in which the family is located that anything in the general nature of a "drill" can hardly be formulated. The outstanding value of the campaign in Lakewood is that it aims to get people to decide what they may or should do about a fire in their home before the emergency actually occurs. The principal first activity would seem to be to concentrate on getting the people out; especially if there are infirm or aged members of the family. Just what to do if fire starts in certain quarters may well be thought out. Attempts by the active members of the family to extinguish the fire, or call the fire department, should not delay the emptying of the house of people. All the family should know where the nearest fire alarm box is, and how to operate it, and children old enough to use the telephone may be instructed how to call the fire department briefly and accurately, and be drilled in closing doors to bed chambers and other rooms as they are vacated, to check draughts. There are now available several types of simple local fire alarms that may be quite fairly depended upon, if maintained properly, to rouse the family on the first or second floors if fire starts downstairs. Many times people are overcome by smoke who could escape quite

easily if promptly awakened. Attic rooms with but a single stair exit may require special consideration. If the attic is occupied by youthful persons, a stout rope permanently tied to an eye-bolt is not a bad resource if fire gets such headway as to cut off the inside stairs. Mature people are not very handy in coming down ropes. They do not calculate their weight and are likely to burn their hands and let go.

The Lakewood committee has prepared a little bulletin with a few simple suggestions applicable to ordinary conditions, which has already been circulated to half the local dwellings. It now suggests including such instruction in the fire prevention curriculum of the public and parochial schools. It might be that a bulletin on this subject would be most effective if presented by a member of the fire department in connection with an annual inspection of homes, and the householder encouraged to discuss with the fireman just what plan might be best for the home under consideration.

Meeting of Board of Directors.

Atlantic City, January 18, 1936.

Members Present.

Albert T. Bell, Chairman
Harold L. Miner, President
George W. Elliott, Vice President
Chas. H. Haupt, Vice President
Frederick T. Moses, Past President
Sumner Rhoades, Past President
Franklin H. Wentworth, Managing Director

H. T. Cartlidge
A. O. Dawson
Russell Grinnell
W. F. Hickey
C. W. Johnson
W. E. Mallalieu
S. D. McComb
Chas. W. Mowry
S. L. Nicholson
C. W. Pierce
David J. Price
A. R. Small

Richard E. Vernor

There were also present Percy Bugbee, Assistant Managing Director, and Robert S. Moulton, Technical Secretary.

Business Transacted.

1. The program of the 40th annual meeting was discussed and suggestions concerning it referred to the Program Committee.

2. Verbal reports from the Executive Office staff were received on the items of Membership, Publications, Advertising, Field Service and Volunteer Firemen's Section, and a unanimous vote of appreciation was given to the Engineering Handbook Committee, Messrs. Mowry, Fiske, Arms, Price and Small, for their valuable work on the Handbook during the year.

3. The status of the New York City Committee was discussed and a

conference with its officers by a special committee of the Board, consisting of Messrs. Rhoades, Cartlidge and Mallalieu, was recommended.

4. On recommendation of the Committee on Hazards and Protection of Small Properties the following action was approved:

Substitute the following in bold face type:

> Prompt notice of the existence of a fire is important and the use of containers holding fire extinguishing material in readily accessible locations is of value in extinguishing fires in their incipient state.

for the paragraph in bold face type appearing in the Regulations governing First Aid Fire Appliances at top of page 3 (Edition of 1931) reading:

> A small quantity of water or other extinguishing agent used intelligently at the start of a fire, may easily be more effective than the work of an entire fire department five minutes later.

5. It was unanimously voted to instruct the Managing Director to advise the AutoFYRstop Company that the Board is unalterably opposed to, and does not consent to, the use of the name or initials of the National Fire Protection Association in any manner on appliances, nor in references thereto, as indicating the Association's recommendation or approval.

6. The following recommendations of the Policy Committee were approved:

> (*a*) That the present policy of submitting N.F.P.A. standards to the American Standards Association only on specific action by the Board of Directors be continued.
>
> (*b*) That the N.F.P.A. be represented upon the A.S.A. Building Code Correlating Committee by Managing Director Wentworth as principal and by Technical Secretary Moulton as alternate.
>
> (*c*) That the offer of Board member W. E. Mallalieu to undertake conferences with underwriter offices with a view to reconciling certain minor differences between the provisions of the N.F.P.A. Flammable Liquids Ordinance and the fire prevention code of the National Board of Fire Underwriters be appreciatively accepted.

7. Board member A. R. Small made an informal report as the N.F.P.A. representative in the American Standards Association.

8. President H. L. Miner was appointed as N.F.P.A. representative on the Safety Code Correlating Committee of the A.S.A. for the two-year period beginning January 1, 1936, with C. W. Rulon as alternate.

9. It was voted to accept invitations from the Building Code Correlating Committee of the A.S.A. to participate as sponsor over sectional committees to be charged with developing detailed requirements for indicated phases of building codes, as follows:

> (*a*) Building Code Requirements for Fire Protection and Fire Resistance.
>
> Scope: Minimum requirements for types of construction; provisions for special or mixed occupancies; restrictions as to location both in fire zones and on property; restrictions as to height and area; fire-resistive characteristics of build-

ing materials and assemblies; protection required for structural members, including floors, partitions, vertical openings, wall and partition openings, ceilings, roof structures and roofing, and fire-stopping.

Proposed joint sponsors: National Fire Protection Association, National Board of Fire Underwriters, National Bureau of Standards.

(*b*) Building Code Requirements for Fire Extinguishing Equipment.

Scope: Requirements for design, installation, and maintenance of sprinklers, standpipes, or other fire-extinguishing equipment.

Proposed sponsor: National Fire Protection Association.

10. Requests for appointment of representatives upon the N.F.P.A. Electrical Committee made in behalf of (*a*) the International Brotherhood of Electrical Workers (Member N.F.P.A.), by the National Electrical Contractors Association (Member N.F.P.A.), and of (*b*) the International Association of Governmental Labor Officials (non-member N.F.P.A.) were referred to the Committee on Technical Committee Procedure for consideration and full report to the Board.

11. The Executive Office was instructed to take no action on a communication from the Committee on Gases relative to Ohio legislation requiring installation of gas-leak detecting devices.

12. It was voted to accept the resignation of Board member A. R. Small from the Committee on Technical Committee Procedure and to constitute this body a standing committee of the Board. Mr. Sumner Rhoades was appointed a committee member to replace Mr. Small.

13. The report of the Committee on Technical Committee Procedure was considered and approved, including action on the following items:

(*a*) The recommendations of the committee relative to committee appointments were approved (see Minute 14).

(*b*) An interim revision of Par. 23 (*a*) of the Regulations on Gas Systems for Welding and Cutting, recommended by the Committee on Gases, was approved subject to confirmation by the Association at the next annual meeting, as follows:

(*a*) Oxygen Piping — Special Requirements. All fittings and lengths of pipe for service lines shall be hammered before assembly to free them from scale. They shall be washed out with a suitable non-flammable solution which will effectively remove grease and dirt. After assembly, they shall be thoroughly blown out to remove foreign materials. Carbon tetrachloride, caustic soda solution and trisodium phosphate have been found effective cleaning agents for this purpose.

(*c*) The technical committee scope statements as printed in the 1935-36 Year Book were confirmed, with the amendment noted in item (*e*) below.

(*d*) Jurisdiction over the suggested ordinance regulating the construction, equipment and protection at petroleum wharves where refined petroleum products are transferred and providing safeguards for such transfer operations (Proceedings 1935, page 405) was transferred from the Marine Section Committee on Tankers to the Committee on Flammable Liquids.

(*e*) The name of the Committee on Fireproofing Processes was changed to "Committee on Fireproofing and Preservative Treatments," and the scope statement amended to read: "Standards for wood, textiles and other combustible materials treated to increase their resistance to fire and to decay and insect attack."

(*f*) Action in assenting to a revision in the standard for Power Operated Radio Receiving Appliances submitted by Underwriters' Laboratories to the American Standards Association under the proprietary sponsorship plan was approved.

14. Appointments to technical committees since the June meeting of the Board were confirmed, including Mr. Arthur G. Smith, Chairman of the Committee on Field Practice, Mr. Wm. D. Grier, Chairman of the Committee on Truck Transportation, and the following appointments subsequent to the printing of the 1935-36 Year Book:

Automatic Sprinklers.
K. W. Jamieson, Canadian Underwriters' Association, replacing C. L. Scofield, retired.
R. W. Wetherbee, Factory Insurance Association.

Aviation.
W. E. Huffman, U. S. Army Air Corps, replacing E. E. Adler.
Jesse Lankford, U. S. Department of Commerce, replacing W. Fiske Marshall.

Blower Systems.
H. C. Murphy, National Association of Air Filter Manufacturers.
Sterling S. Sanford, Edison Electric Institute.

Farm Fire Protection.
B. F. Allnutt, Chemical Fire Extinguisher Association, replacing G. R. Stephens.

Flammable Liquids.
Fred O. Clark, Oil Underwriters.
Charles H. Fischer, Consulting Engineer.

Storage of Combustible Fibres.
H. D. Cutter, Jr., South-Eastern Underwriters Association, replacing Hugh Hill, Jr.

Truck Transportation.
T. P. Callahan, Manufacturing Chemists Association of the United States.

Fireworks Casualties and Regulation.*

Following the dreadful record of 215 deaths and 5092 injuries in the Independence Day celebration of 1909, the National Fire Protection Association began a campaign for a rational observance of this historic holiday. The Association's members responded promptly and enthusiastically to the appeal for a concerted attack upon this annual orgy of fire, noise, and death. By 1912, according to statistics compiled by the American Medical Association, the number of deaths was reduced to 41 and the number of injuries to 947.

In recent years no one has been compiling complete data on Fourth of July fireworks casualties. However, nation-wide studies made by the American Medical Association and the American Museum of Safety show that during the 30-year period from 1900 to 1930, more American lives were lost in celebrating our independence than were lost in acquiring it in the Revolutionary War. These figures are:

Americans killed by fireworks (30 years)	4,290
Americans killed in Revolutionary War	4,044
Americans injured by fireworks (30 years)	96,000
Americans injured in Revolutionary War	6,004

These figures do not include the many deaths which occur long after the Fourth as a direct result of fireworks accidents on that day.

In 1927, the American Museum of Safety and the National Society for the Prevention of Blindness made a study of Fourth of July casualties occurring from June 19 to July 17 of that year. Reports from 38 states showed that:

161 persons had been killed by fireworks.
54 burned to death when clothing ignited.
52 were children less than 5 years old.
21 children died as the result of eating fireworks.
20 children burned to death by "harmless sparklers."
32 were shot by "unloaded guns" or stray bullets.
30 lost one or both eyes.
300 others suffered eye injuries.
1,900 persons were otherwise injured.

*Material for the preparation of this article was taken from information on file in the offices of the National Fire Protection Association, and from three addresses made before a conference on this subject under the auspices of the American Museum of Safety and the National Society for the Prevention of Blindness at New York on December 6, 1935. The first address was by Louis Resnick, Director of Industrial Relations of the National Society for the Prevention of Blindness; the second by C. H. Fleming, Executive Secretary of Pyrotechnic Industries, Inc.; and the third by John Williams Avirett, 2nd, President of the Maryland Society for the Prevention of Blindness. Readers may obtain a copy of these addresses upon request to the National Society for the Prevention of Blindness, 50 West 50th Street, New York City.

Coming!—Independence Day, July 4.

A nation-wide study of casualties from fireworks in 1935 was begun on July 5, 1935, by the American Museum of Safety in coöperation with the fireworks manufacturers and under the direction of Dr. Leland E. Cofer. While the study is not yet completed, it has been found that at least 30 persons were killed and 7738 persons were injured in celebrating the Fourth of July last year. These figures include only those persons killed or injured that were reported in the newspapers. This study makes it possible to supplement newspaper data with first-hand information from the families of the persons killed or injured, from the doctors who attended them, the hospitals to which they were taken, and from the police officers who assisted them.

It was found that 19 of the 30 persons killed, and 1760 of the 7738 persons injured, were children between the ages of one and fifteen. Nine out of ten persons requiring medical attention were so seriously injured that they were taken to hospitals. Approximately 80 per cent of the casualties occurred on the Fourth of July, 11 per cent in the two weeks preceding, and 9 per cent in the two weeks following the Fourth.

This study proves that there are no such things as "harmless fireworks." More than two-thirds of the casualties were caused by the common firecracker, and the so-called "harmless sparkler" caused 90 casualties and several fatalities. Cherry bombs caused 298 casualties, torpedoes 175, and cannon crackers 142 casualties.

In his analysis of how fireworks accidents occurred, Dr. Cofer said that fireworks accidents remind one of war injuries because of the growing practice of hurling fireworks at other persons — especially in passing automobiles, and because so many of the reports stated that the victim supposed the firecracker was no longer lit and so he picked it up. The frequency with which severe

explosions followed reminded Dr. Cofer of the reports after the World War which told of peasants in France being killed or injured by picking up unexploded bombs in the battle fields.

Property Loss Due to Fireworks.

Fire losses due to fireworks are now averaging about one million dollars a year. According to figures compiled by the National Board of Fire Underwriters, this loss averaged $299,971 a year during the five years beginning with 1915, as compared to $899,912 a year during the five years beginning with 1925. While this monetary loss is appreciable, it is not nearly so significant a problem as that of loss of life and personal injury.

Efforts to Reduce Number of Casualties.

The National Fire Protection Association has continued steadily its educational work in this matter, operating through its widely distributed membership and its field engineering staff, but these combined efforts have not made the headway the gravity of the subject deserves. Against satisfactory progress have stood the barriers of inherited custom and the desire for profits on the part of the companies making and distributing pyrotechnics.

Perhaps it is too much to expect a complete return to sanity, but some effort at least may be made by all cities and towns toward leading their people into more moderate and more intelligent forms of celebration. If explosives must be used, the authorities can limit their use to supervised public displays, thus limiting the danger of killing or injuring people and destroying property. It is obvious, however, that no rapid progress can be made in the restraint of these orgies of fire and death without effective legislation, and the recent entry of the American Museum of Safety and the National Society for the Prevention of Blindness into the field of such measures gives promise of the provision of influence and financial resources sufficient for a hopeful advance.

Last year several conferences of representatives of a considerable group of societies concerned with public welfare, of which the National Fire Protection Association was one, were called by the officers of the National Society for the Prevention of Blindness. These conferences crystallized in the study of casualties incident to the celebration of Independence Day in 1935 (results to date of which were given early in this article), and in the presentation of the following resolution:

WHEREAS commemoration of our Independence, through use of fireworks, has resulted in greater loss of life and greater toll of personal injury and property loss than occurred in the winning of this Independence, and

WHEREAS, despite numerous local ordinances prohibiting sale and use of fireworks and repeated warnings concerning the danger of accidents from fireworks, children are still being killed by scores and injured by thousands through fireworks accidents each year, and

WHEREAS complete suppression of the sale of fireworks by retail merchants — even

in cities having ordinances prohibiting the sale of fireworks — is practically unattainable, and

WHEREAS suppression of the sale of fireworks in cities — if this were possible — would be nullified by the widespread roadside sale of fireworks in suburbs and rural communities adjacent to cities, suppression of which also seems impracticable,

THEREFORE BE IT RESOLVED by this conference of representatives of national and local agencies concerned with sight saving, public health, and public safety, assembled under the joint auspices of the American Museum of Safety and the National Society for the Prevention of Blindness,

First, that the greatest hope for effective control of the sale and use of fireworks, and a consequent reduction in the number of fireworks casualties, lies in control of the manufacture and sale of fireworks at the source, namely, the factory.

Second, the manufacture and sale of fireworks should accordingly be restricted — through national and state legislation — to the following:

Army and navy departments of the United States Government;

Railroads, steamship lines, aviation companies, quarries and other industrial or commercial concerns requiring pyrotechnics for the normal conduct of their business;

Federal, state, municipal or county governments, and such incorporated clubs or associations as can guarantee that fireworks will be discharged on their premises under immediate supervision of pyrotechnic experts.

Third, commemoration of Independence Day through the use of fireworks, firearms and bonfires should be sharply discouraged, if not altogether discontinued, and in its place there should be developed, through an intensive nation-wide campaign of education, programs of patriotic celebration in which athletic events, pageantry, and other forms of wholesome recreation would eventually eliminate children's desire for the excitement of fireworks, firearms, and bonfires.

Fireworks Manufacturers' Attitude.

Pyrotechnic Industries, Inc., an association of fireworks manufacturers that produce about 90 per cent of the fireworks made in the United States, and about 50 per cent of those sold in the United States, has taken some action to reduce the number of fireworks casualties. Mr. C. H. Fleming, Executive Secretary of that association, stated that it is the opinion of their members that the source of supply is the only logical point of regulation or control, and that they were in accord with educational programs attempting to reduce the number of Fourth of July accidents due to the misuse of fireworks.

The manufacturers insist that most accidents result from the use, and especially the misuse, of certain fireworks that are distinctly more dangerous than others. Unfortunately these dangerous items appear to be the easiest and cheapest to make and the easiest to sell. Apparently many small manufacturers are exploiting these conditions and are unwilling to coöperate with the larger manufacturers belonging to Pyrotechnic Industries, Inc., in making acceptable fireworks from the standpoint of safety to the user.

The fireworks industry believes that absolute prohibition is not possible of attainment, and that fireworks are justified and desirable in the celebration

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of Independence Day. It contends that if complete prohibition were attempted, there would be a public demand for the materials available at drug and hardware stores for the making of more dangerous fireworks than are now sold, and that experimental and bootleg fireworks may produce an equal number of serious accidents.

Speaking as an individual who is concerned with the forces that make for public opinion and for public action, Mr. Louis Resnick, Director of Industrial Relations for the National Society for the Prevention of Blindness, said, "If the fireworks manufacturers do not of their own accord eliminate those items that are causing loss of life and warlike lists of wounded each year, then the time will come before long when America will wipe out the entire industry and with it the barbarous practice of burning children alive, gouging their eyes out and blowing their hands off in the crazy notion that this is patriotism."

Suggested Federal Legislation.

Apparently adequate state and federal legislation is needed to properly control the manufacture and sale of fireworks. Mr. Fleming (of Pyrotechnic Industries, Inc.) suggests the following plan of federal regulation:

"In Canada, in the Division of Explosives under the Department of Mines, all fireworks items have to be examined and approved before they can be offered for sale to the public. Under this regulation the Canadian public still enjoy the fireworks, and the resulting accidents are nil. Our association has attempted to duplicate as near as possible the Canadian type of regulation by having a federal bureau established which would have to approve all fireworks before they could be manufactured or imported for sale.

"There is a quasi-federal agency in the United States, the Bureau of Explosives under the Interstate Commerce Commission, that has the necessary laboratories and a personnel completely familiar with fireworks. At the present time they examine the products of the various fireworks manufacturers, but solely for the consideration of safety in transportation, which has no definite relation to safety in use. Here we have a capable agency all set up, completely equipped and with a personnel thoroughly familiar with fireworks. I do not know exactly how it could be accomplished, but I do believe that if you gentlemen (those attending the joint conference of the National Society for the Prevention of Blindness and the American Museum of Safety, in New York, December 6, 1935) were to attempt it, with the coöperation of this group of fireworks manufacturers, which I assure you would be given, a way would be found to have fireworks that are dangerous in use as well as in transportation condemned by the Bureau of Explosives, and barred by the Interstate Commerce Commission. If this were accomplished our problem would practically be solved.

"It is true that the intra-state traffic and bootlegging of dangerous fireworks would not be provided for. I do not, however, know of any instance where even the outlying fringe of the industry, who live on dangerous items, now manufacture any items that are barred from interstate transportation and I am confident that any items so barred would not continue to be made. If they should be, at least a national standard would have been established and I do not believe that it would take the states long to accept that standard and prohibit the sale of fireworks not approved by the bureau. The problem of bootleg and home-made fireworks would only become serious as a result of absolute prohibition.

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Fireworks in the hands of a small boy started this fire in Spencer, Iowa, which destroyed 24 buildings with a loss of $800,000.

"Our association has given the problem of fireworks accidents a great deal of thought. We have probably discussed every known form of regulation and it is our conviction that the type I have outlined, which is working so admirably in Canada, is the practical plan. We want to stop making dangerous fireworks, but this is useless as long as we know that they will be replaced by far more vicious fireworks offered by unscrupulous manufacturers."

Suggested Elements of State Legislation.

Approximately half the states have some kind of prohibitive or restrictive fireworks legislation, but many of these laws and regulations are ineffective and inadequate. John W. Avirett, 2nd, President of the Maryland Society for the Prevention of Blindness, suggests the following elements which he thinks an adequate state law should contain.

1. It should be state-wide in effect and should prohibit the indiscriminate sale and use of fireworks as therein carefully and comprehensively defined, except to and by the holders of permits issued pursuant thereto by properly designated local authorities.

2. It should exempt the sale of fireworks to and the use thereof by army and navy departments of the state or federal governments, and transportation, industrial or commercial concerns requiring combustible or explosive preparations for and in the normal conduct of their business.

3. It should provide for the issuance of permits for public displays as therein provided upon application in a form prescribed which will give the authorities such information as they need to investigate the responsibility of those in charge of the display.

4. It should provide that permits so issued should be non-transferable and should not relieve the holder thereof or the person using fireworks pursuant thereto from compliance with such rules and regulations as may be laid down by the governing authorities of the locality in which the fireworks are used and should further provide that nothing in the law or the permits issued under it shall authorize the sale or use of fireworks in any country, city or town in which such sale or use is otherwise forbidden by law.

5. It should require those actually responsible for discharging the fireworks to be competent to handle such work and should require them to post a substantial bond with the treasurer of the state for the payment of such judgments, if any, as may be obtained against them for injuries to property or damage arising out of the conduct of the displays.

6. It might well provide that any one causing personal injury or property damage by discharging fireworks in violation of law should be absolutely liable for such damage. There should at least be such a provision covering injuries resulting from persons throwing firecrackers at others.

7. The penalties imposed upon those convicted for violations should be substantial, but not too large, with a larger fine for sellers than for those discharging fireworks. Moderate minimum fines with a leeway for larger fines in flagrant cases would promote convictions.

None of these elements is novel and practically all of them in one form or another appear somewhere in the many existing laws. After years of study of this problem Mr. Avirett, as well as many other authorities, is convinced that fireworks casualties can be reduced through proper legislation adequately enforced.

Suggested Municipal Fireworks Ordinance.

Most of the largest cities in the country, and a number of small cities and towns in nearly every state have some kind of ordinance prohibiting or regulating fireworks within their corporate limits. The National Fire Protection Association has for many years published a form of model fireworks ordinance which has influenced much local legislation on this subject. A more comprehensive model ordinance, based upon legislation in effect in Philadelphia and other cities, was adopted by the Association in 1927 on recommendation of the Committee on Pyrotechnics. This model ordinance is printed below in condensed form. A prohibition of the discharge of firearms in the streets may also appropriately be prohibited in an ordinance of this kind, but is not included in the ordinance as printed below, because this subject is often covered in other municipal legislation. Likewise ammunition, dynamite and other explosives used for blasting are commonly covered by separate state laws or municipal ordinances.

Model Ordinance.

To prohibit the use and sale of fireworks, fire crackers, sparklers, and other pyrotechnics, regulating pyrotechnic displays and regulating the having, using, storing and keeping of fireworks, fire crackers, sparklers and other pyrotechnics in the city of.....

SECTION 1. The Council of the City of.....Ordains, That on and after....., it shall be unlawful and it is hereby prohibited, for any person, persons, firm or corporation, to store, sell, offer or expose for sale, or have in

possession with intent to sell or to use, discharge or cause to be discharged, ignited, fire or otherwise set in action within the limits of the City of....., any fire works, fire crackers, rockets, sparklers, torpedoes, roman candles, fire balloons, or othe fireworks, or substances of any combination whatsoever designed or intended for pyro technic display; except after having obtained a license as hereafter provided.

SECT. 2. Licenses for the public display of fireworks by properly qualified individual or corporations, or by the city officials, under the direct supervision of experts in th handling of fireworks, may be issued by the....., in such form as may be prescribed and upon furnishing such information as he and the Chief of the Fire Department ma require: Provided, That such display or displays shall be of such a character and so located discharged or fired, as in the opinion of the Chief of the Fire Department, after prope inspection, shall not be hazardous to property or endanger any person or persons; Provided That application for such licenses be made fifteen (15) days in advance of the date o display.

SECT. 3. Such fireworks or devices for pyrotechnic display may be stored within th limits of the City of.....when the license for such storage has been issued by the.....of the City of..... Provided, The building or premises in or upon which such storage is to be made has been properly inspected by the Chief of the Fire Department and certified as a proper place for such storage; Provided, That no license shall be issued for such storage within five hundred feet of a school, hospital, church or other public institution or any building used as a place of public assembly.

SECT. 4. The provisions of this ordinance shall not apply to articles of the kind and nature herein mentioned, which shall be in the possession of railroads or transportation companies for the purpose of transportation, unless the same shall be held voluntarily by such railroads or companies as warehousemen; Provided, That none of the provisions of this ordinance shall apply to signaling devices used by railroad companies or to explosives used for blasting or similar purposes.

SECT. 5. Any person, persons, firm or corporation doing any of the acts or things prohibited by the preceding Sections of this ordinance or violating any of the provisions hereof, shall be subject to a penalty: For selling, offering or exposing for sale, or having in possession with intent to sell, or for storing without a license, any fireworks, fire crackers, rockets, sparklers, torpedoes, roman candles, fire balloons or other fireworks or substances of any kind whatsoever, designed or intended for pyrotechnic display, the sum of One Hundred (100) Dollars for each offense; and for using, discharging or causing to be discharged, ignited, fired or otherwise set in action, any such fire crackers, rockets, sparklers, torpedoes, roman candles, fire balloon or other fireworks or substances as aforesaid, the sum of Ten (10) Dollars for each offense.

SECT. 6. The Chief of the Fire Department, with the approval of the..... shall seize, take, remove or cause to be removed, at the expense of the owner, all stocks of fireworks, or combustibles offered or exposed for sale, stored, or held in violation of this ordinance.

SECT. 7. All ordinances and parts of ordinances inconsistent herewith are hereby repealed.

Results in Cities Having Fireworks Ordinances.

In some cities adopting such an ordinance it has been found that the number of fireworks accidents has not been reduced. This is usually due to inadequacy of the ordinance itself or reluctant enforcement, and because fire-

Sale of fireworks on wooden stands in the street, in a large eastern city. These stands in front of large stores in the high value retail district were for days a menace to the crowds of shoppers as well as to all property in the vicinity.

works are bootlegged within the city or sold openly at roadside stands outside the city limits or in neighboring towns.

A few typical examples will suffice to demonstrate the results obtained from good ordinances actively enforced by city authorities and supported by an enlightened public opinion.

In Baltimore, Maryland, the ordinance prohibits the throwing or firing of any combustible fireworks or explosive preparations within the city except as authorized by a permit from the mayor. It provides that it shall be unlawful for any person to sell or offer for sale within the city limits any firecrackers subject to certain exceptions. It prohibits the manufacture of fireworks within the city limits. Penalties are provided.

The effect of this ordinance in the City of Baltimore, in spite of no effective state regulation, is demonstrated by the fact Baltimore, and the State of Maryland exclusive of this city, have approximately equal populations, yet in 1935 there were 16 fireworks casualties in the city and 100 known casualties outside the city. Experience with this ordinance has shown the necessity for constant vigilance and the shaping of public opinion toward safe and sane Fourth of July celebrations. There has been repeated agitation on the part of

those commercially interested in the manufacture and indiscriminate sale a
use of fireworks to liberalize the ordinance in their favor.

Along with strict enforcement of the Baltimore ordinance, there has be
an increased use of public displays of fireworks. On the Fourth of July la
year, three displays were conducted in public parks under the auspices
community associations, two by country clubs, two by athletic clubs, and o
by a public amusement park. Each display was put on by experts from t
manufacturing company which sold the fireworks. There were special deta
of firemen and policemen to look after the order and safety of the spectato
Each display was conducted under a permit issued by the so-called safe a
sane celebration committee appointed by the mayor to supervise Fourth
July celebrations. These permits are issued on application by the associati
or club desiring to conduct the display, and on the approval of the Board
Fire Commissioners and of the Police Commissioner.

Taking two cities of comparable size in the same state, the following tab
shows the value of an ordinance prohibiting the sale and use of fireworks.

Year	Fireworks Casualties	
	New Haven, Conn.	Bridgeport, Conn.
1930	143	211
1930 (after July 4)	Ordinance rejected	Ordinance adopted
1931	152	7
1932	79	6
1933	83	4
1934	104	2

During the five years from 1923 to 1927 Detroit had an average of
fires from fireworks each year. In May 1928 a fireworks ordinance was pass
and during the next seven years, 1928 to 1934, there was a total of only
fires caused by fireworks.

Up until a year ago firemen in Milwaukee answered an average of
calls on the Fourth, and in 1934 fireworks caused injuries to 190 perso
Then the city passed an ordinance barring all shooting of fireworks, and t
next Fourth of July (1935), only four alarms were turned in and only fi
persons were injured.

Conclusions.

All of those sincerely interested in the problem of reducing firewor
casualties seem to agree that the manufacture and sale of fireworks should
restricted through proper federal, state, and local legislation adequately e
forced. Experience demonstrates the value of local fireworks ordinances, b
state-wide and possibly federal legislation properly enforced is necessary f
complete control.

The manufacturers of most of the fireworks made in the United Stat
will not agree to complete prohibition, but would be willing to stop maki

the most dangerous items if they could secure the complete coöperation of all the manufacturers.

All interests concerned seem to agree that continued public education is desirable. The manufacturers of fireworks would educate to reduce the casualties due to the misuse of fireworks, but those interested chiefly in public welfare and not in profits would go further and educate to discourage the use of fireworks except in supervised public displays.

Now that the American Museum of Safety and the National Society for the Prevention of Blindness have moved to exert their influence to curtail fireworks deaths and casualties by promoting regulative legislation, our annual orgy of fire and noise may be translated into observances more consonant with the character of a grown-up nation. Two bills are at present before the New York legislature aimed at this result.

Will You Help Lead Him?

Fire Protection Courses in Universities.

Fire protection is now generally recognized as a special branch of gineering, for which special training is needed. The fire protection engir uses technical knowledge from the fields of civil, chemical, electrical, mecha cal and other branches of engineering, and many of the present fire protect engineers are university or technical school graduates in one of these ol branches of engineering, who through a long period of apprenticeship a graduation have learned the applications of engineering science to fire prot tion, and have acquired the additional special knowledge peculiar to this fi Unlike some other branches of engineering, fire protection requires knowle in a wide variety of fields, for the successful application of measures of prevention and fire protection in any individual occupancy must be based an understanding of the technical problems of that occupancy.

There is comparatively little fire protection engineering instruct now available to the students in the universities and technical schools of United States and Canada. In consideration of the need for more technica trained men in state departments responsible for the administration of laws and in municipal fire departments, as well as in fire insurance organi tions, the N.F.P.A. Executive office early in 1936 sent a questionnaire to principal universities and technical schools of the United States, to determi the extent to which fire protection engineering instruction is now availab The replies are summarized below:

Armour Institute of Technology.

The only complete college course in fire protection engineering is offe by Armour Institute of Technology in Chicago. This is a standard four-y program on the same plane as other engineering courses and leads to the deg of Bachelor of Science. The specialized courses given during the third a fourth years cover such subjects as construction and equipment of buildin water supply and distribution systems, fire extinguishing apparatus, underwr ers' specifications relating to construction and installation of apparatus havi a bearing on fire hazards and fire protection, special hazards of various oc pancies with emphasis on inspection methods, economics and operation of fire insurance business, fire insurance legislation and taxation, functions of spection and rating bureaus, and fire insurance policies. Use is made of equipment of Underwriters' Laboratories, and a series of field inspection tri are made during the senior year. About 330 men have graduated from department of fire protection engineering since it was established in 1903, majority of whom are now employed by fire insurance organizations.

Courses Offered by Leading Schools.

The Insurance Department of the Wharton School of Finance and Commerce of the University of Pennsylvania offers a one-semester course in loss prevention activities of insurance companies which covers fire waste, planning and construction of buildings, special hazards, protective facilities, inspections and surveys, moral hazard, salvage, and relations of fire hazards to insurance rates. In a course in property insurance, about four weeks are devoted to fire prevention and protection.

Syracuse University has a one-semester course in property insurance in the College of Business Administration in which fire protection is emphasized, and part of a course in general insurance is devoted to fire protection. The text used in the first course is Property Insurance, by Huebner; and in the second course, Insurance Principles and Practice, by Riegel and Loman.

A one-semester course in fire prevention engineering, open to seniors and fifth-year students, is offered by Northwestern University in its School of Engineering. A few universities, notably the University of Minnesota and the University of California, offer courses in forest protection which cover forest fire control, prevention, suppression, and equipment.

Harvard University, Cornell University, the University of Illinois, University of Michigan, and the University of Southern California reported that they offered no special courses in fire protection, but that the subject was brought to the attention of students throughout various engineering courses. Typical examples of such courses are architectural design, city planning, air conditioning, water supplies, technology of materials, and fireproof construction.

Universities Sponsoring Short Courses for Firemen.

Several universities have taken an active part during the last decade in promoting training for firemen. This is done through their extension division, engineering college, department of vocational or industrial education, or similar division. In more than half of these universities, a professor has complete charge of the fire school or schools, and in others they are merely one of the agencies coöperating to conduct this training. These fire schools are generally state-wide schools held at some central location for two or three days in the summer. Students other than firemen may attend and certificates are usually issued, but no college credit is given. Universities doing this type of training in fire protection are:

Georgia School of Technology
University of Illinois
Iowa State College
University of Kansas
University of Maryland
University of Michigan
Michigan State College
University of Minnesota
University of Missouri
Ohio State University
Oklahoma A. and M. College
Oregon State College
Pennsylvania State College
A. and M. College of Texas
West Virginia University
University of Wisconsin

Training for the Public Service.

Five universities offer integrated courses specifically designed to trai students for the public service, of which fire prevention and fire protectio is a part. These are the University of California, University of Michiga Stanford University, Syracuse University, and the Texas Agricultural an Mechanical College. Graduate standing is uniformly a prerequisite to enroll ment in these courses, and a three months' field apprenticeship is usuall added to the one academic year as a requirement for graduation. Syracus University, which probably has the most comprehensive course in publi administration, devotes one full week to public fire prevention and protectio

Twelve other universities offer courses in public administration consid ered suitable for preparing students for positions in the public service. Thes are:

Boston University	University of Kansas
Brown University	University of Kentucky
University of Chicago	Massachusetts Institute of Technology
University of Cincinnati	Ohio State University
Harvard University	University of Southern California
University of Illinois	University of Wisconsin

An extension course in municipal fire administration is now being pre pared by the Institute for Training in Municipal Administration and co ducted by the International City Managers' Association at Chicago. A nomi nal fee will be charged for the course, and upon satisfactory completion, th Institute will make application to any university for credit toward a degree.

Conclusion.

Fire insurance organizations have for many years engaged young me for inspection and similar work who have had engineering training. Only i recent years, however, have municipal officials begun to realize the possibilitie in reducing fire losses by employing technically trained men in fire depar ments. Mayor LaGuardia of New York City picked ten men last year to tak a four-year engineering course at the city's expense to qualify them for tec nical positions in the fire department. Chief George B. Goff of Oklahoma Cit has a number of college trained men in his department. As the public fi service becomes more attractive and municipal executives and fire chiefs rea ize more fully that fire protection is an engineering profession, the demand o universities for special courses in fire protection should grow.

Electric Wiring Inspection in Michigan.

By L. P. Dendel,*
(Member N.F.P.A.)

A study made in 1932 of the causes of farm fires in Michigan showed that fires from defective electrical wiring and equipment in rural districts destroyed over $100,000 worth of property per year in the properties insured by the seventy odd farmers' mutual fire insurance companies alone in the state. It is safe to presume that at least $150,000 additional losses charged to unknown causes were also due to defective wiring. Insurance executives became disturbed at these figures, and also concerned about the proposal of the federal government to appropriate huge sums of money for the extension of rural electrification in the United States.

After two or three years of hard work, an electrical license and inspection law was finally adopted by the state legislature, effective September 22, 1935. While sponsored by insurance interests, the bill also had nearly 100 per cent backing of other interests, such as the electrical utilities, electrical contractors, electrical inspection organizations, labor organizations, state fire marshal, and the chief electrical inspector and the building commissioner of Detroit.

This new law requires all electrical contractors and electricians to be licensed after passing an examination. It provides for the supervision and inspection of all new electrical wiring installations in rural districts and the smaller cities and towns, just as many of the larger cities have required for years. It also provides for the adoption and enforcement of minimum standards by an electrical administrative board. The minimum standards are those prescribed by the National Electrical Code, subject to the approval of the state fire marshal.

State Electrical Administrative Board.

As provided in the act, the governor has appointed the Electrical Administrative Board consisting of one representative each from electrical contractors, underwriters' inspection bureau, municipal inspectors, electrical public service corporations, and electrical employees organizations. The state fire marshal is an ex-officio member. This board was deemed necessary to secure proper administration of the act because the state fire marshal already had so many other duties.

The writer was appointed by the governor to represent the insurance interests, and at the first meeting of the board was elected chairman. The board

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appointed as chief electrical inspector and executive officer, Mr. A. T. Babbit who was for some years with the Michigan Inspection Bureau at Detroit. H is now contacting cities not having electrical inspection to promote the ado tion of local ordinances for licensing and inspecting. He also holds schools f instructing contractors and journeymen on the National Electrical Code rule

To date, the law is working out well, and the board has already appointe inspectors to cover 88 per cent of the population of the state that now h electric service. The plan is, in general, to have one inspector for each distri usually comprising one county, although in some cases one inspector ma take care of two or three counties. In cities that now have or later ado inspection ordinances, the Electrical Administrative Board has no jurisdicti over inspections except to prescribe minimum rules for wiring and to exami city inspectors.

Permits, Inspections, and Fees.

In addition to requiring a contractor to pass an examination and pay fee before he can do wiring, the law requires, before any new wiring c be installed, either by a contractor or the property owner himself, that a pe mit be obtained from the local inspector — at which time a fee is paid f the inspection which will be made when the job is completed. The minimu fee is $2.50 for any installation up to and including four circuits, which cove the usual farm installation. The schedule of fees is uniform regardless of t distance traveled in order to make the inspection.

A large number of farm mutual companies have arranged for inspecti old or existing wiring in farm properties that they insure. The company pa for the inspection with the understanding that the farmer policyholder w pay for the necessary cost of making moderate changes which will bring t installation up to a reasonable standard of safety.

The annual fee for a Class I electrical contractor's license is $25. Th permits the contractor to operate anywhere in the state without additio expense other than the usual inspection fees which have been customar charged in cities having an inspection ordinance, except that to work another city where there is an inspection ordinance he must register with t local inspection authority and pay a registration fee of not over $1. For Class II contractor's license the fee is $5. This class includes only th rural contractors who work singly and do not employ electrical journeym and who do no electrical wiring in any city having an inspection ordinan For the Class III or journeymen's license the fee is $1, with a registration fee not over fifty cents when doing electrical work in any city having an insp tion ordinance. Contractors who themselves do electrical wiring must a have a journeyman's license.

District inspectors are paid on the fee basis, the same as now done cities. Cities having their own inspection ordinances are permitted to ret

one-half of the license fees and all the inspection fees collected, for the operation of their own city departments to supervise inspections and license electricians. The estimated income from contractors' license fees is $20,000 a year, and the estimated expense for the administration of the new law is $18,000, so it appears that the law will be self-supporting.

Arguments Used to Secure Adoption of Law.

Some of the points other than the loss figures, brought out in the campaign for the adoption of this electrical law, were:

1. That there is a real demand from the rural population to have the same safeguards from electrical fires as city dwellers. Because of a general lack of fire protection in rural districts, fire prevention is all the more essential. That this demand was real was evidenced by the by-law adopted by 62 farmers' mutual fire insurance companies requiring electrical inspection in order to make a policy valid as regards fires from defective wiring. These companies are now looking to the legislature to provide an organized, self-supporting, inspection service that will be reliable.

2. Unapproved and defective wiring materials not permitted in inspected cities are dumped onto the unsuspecting village and rural property owners. The National Electrical Code specifies the use of a flame-resisting insulation for wires, which is now required in cities having inspection. The old style wire is cheaper and will continue to be used in rural communities — which will deprive the rural dweller of proper electrical safety.

3. The small inspection fee paid by the contractor or installer will usually save the owner from $15 to $50 on his wiring job. As the average complete farm wiring job costs about $140, this is a good investment, to say nothing of the increased safety.

4. Property owners near a city must go to the expense of rewiring when their district is annexed to the city and the wiring was not originally installed so as to pass inspection; this expense will be unnecessary if the original installation is standard.

5. Many head of live stock have been electrocuted by improperly installed or defective wiring in barns. It takes only about 70 volts to kill a domestic animal.

6. The 1929 law required the state fire marshal to make regulations for electric wiring, but provided no funds for inspection. The proposed bill provides for the use of existing city inspection facilities where possible, and for an organized state-wide self-supporting inspection service.

7. The wiring rules specified in the bill are the National Electrical Code rules which are recognized as the minimum standards for safe wiring throughout the entire United States and are accepted as such by the courts.

8. This bill would affect only wiring hereinafter installed and would not prevent the owner from making minor alterations and repairs to wiring on his own property or from installing his own wiring system, if installed in accordance with the National Electrical Code rules.

9. This act would not apply to any city or village that now has or may later have an electrical inspection ordinance. The larger cities have for years maintained their own electrical inspection departments to eliminate unnecessary fire hazards and to entitle them to a lower class fire insurance rating.

Michigan has been one of the leading states in the expansion of rural electrification. In 1926, 6800 farms were connected to transmission lines, and in 1935, over 42,000 farms were connected. Government figures show that not over 10 per cent of the farms in the United States have electric service,

but that 25 per cent of the farms in Michigan have it. Public utilities now supply Michigan farmers with approximately 28,000,000 kilowatt hours annually by 10,000 miles of transmission lines.

Good Results Expected.

Michigan is the only state to have such a comprehensive state-wide electrical contractors' licensing and inspection law which definitely requires inspection of every new installation of electric wiring. Fire prevention enthusiasts all over the country are watching with interest the operation of this new law. We realize that this is "a noble experiment" and are feeling our way. So far the public reaction has been very favorable, and we feel that this new program is going to accomplish much good in the way of reducing losses to life and property due to fires of electrical origin — especially in the rural areas of the state.

New York Restaurant Fire Tragedy.

Six men and three women lost their lives and thirty-four other persons were injured, a number seriously, as a result of panic occurring when fire broke out on the floor below while members of the Holy Name Society of the Roman Catholic Church of Our Lady of Peace, an Italian church, were attending a banquet in Lum's Chinese Restaurant at 735 Lexington Avenue, New York City, on the evening of February 12, 1936. The fire spread rapidly from a store on the first floor to the restaurant which occupied the entire second floor. Four persons were trapped and died of suffocation and five others died in hospitals from injuries received in the panic. Approximately one hundred and fifty persons were in the restaurant when the fire occurred.

Construction and Occupancy.

The building in which the fire occurred was an ordinary three-story brick structure erected in 1927, and covered an area of 8300 square feet located at the corner of Lexington Avenue and Fifty-ninth Street.

The building presumably complied with the New York building code when erected. The two stairways above the first floor were enclosed with hollow tile walls and had metal covered doors on the openings. Two double swinging doors of metal and wired glass opened on each stairway from the restaurant, and access to the exits was unobstructed, and other exit details complied with the building code.

The interior finish was largely plaster on metal lath, with sheet metal ceilings. There were no unprotected vertical openings between the street and second floors. The first floor contained several mercantile establishments, including the National Shirt Shop, in which the fire originated. Lum's Chinese restaurant occupied the entire second floor. The restaurant had an exit to each

International.

Nine persons were killed and thirty-four injured in this second floor Chinese restaurant fire at the corner of Lexington Avenue and 59th Street, New York City, on the evening of February 12, 1936. The fire originated in draperies in a show window in the National Shirt Shop in the center of the picture. This photograph shows the Lexington Avenue side of the building. The panic and rush to the stairway occurred around the corner on 59th Street, where there was another entrance.

street. The ceiling of the restaurant was covered with festooned silk cloth for decorative purposes. The third floor was practically vacant and was little affected by the fire.

Story of the Fire.

The fire started in the National Shirt Shop, a small retail men's furnishing store, located in the first floor, while the proprietors were arranging stock. The alarm was recorded at 9:21 P.M. Merchandise had been removed from the north show window by a clerk, who fifteen minutes later discovered the fire burning in the draperies in that window. He called the manager and his assistant, who were in the basement, to bring some water. They ran to the rear of the basement, and to get water into the pail it was necessary to attach a small piece of rubber hose to the faucet. Carrying the pail of water upstairs,

they dashed it on the blazing draperies, but the fire spread rapidly. A second pail of water was brought while the assistant manager unlocked the front door and ran to the corner, where he turned in a fire alarm. The clerk left the entrance door open, which resulted in the fire extending throughout the store, breaking the show windows. The flames swept up the front of the building from the show windows and open entrance door. The fire also communicated to a drug store adjoining on the corner, through a cornice and wooden lath and plaster partition wall.

From the time of the discovery of the fire until the alarm was turned in there was a delay of approximately five minutes, according to the testimony of several witnesses.

There was no electrical equipment or wiring at the point where the clerk discovered the fire in the draperies. His vision, he said, was partly obstructed by a wooden office partition in the store directly behind the show window. The clerk who discovered the fire was the only person to enter the show window and remove merchandise. He and the others in the store admitted being cigarette smokers, but denied smoking in the store.

The three men in the store testified that about twenty minutes before the fire, after the merchandise had been removed from the show windows, in preparation for a sale the following day, they had detected the odor of something burning similar to burning sugar — not rubber — but had failed to trace its source, and after an investigation concluded it came from an adjoining store, where a new restaurant was being constructed.

Occupants of the restaurant above the store reported having smelled smoke for some minutes before they had knowledge of the fire in the store below and some of the patrons believed it was due to Chinese incense.

A policeman, followed by several firemen, dashed into the restaurant and ordered the patrons out, informing them of the fire. The warning was generally disregarded, only a few men and women leaving the premises. The others, not thinking it was dangerous to stay in the place, despite the fact that smoke was entering the restaurant, remained there. Of a sudden, a large plate glass window on the Lexington Avenue end of the building cracked and broke from the heat at a point directly over the shirt shop, and the drapes and hangings in the restaurant were ignited and swept by the flames. In the stampede that resulted some of the patrons rushed to the 59th Street exit, while others attempted to get their clothing at a check room. It was near the check room that three persons lost their lives.

The policeman was knocked from a chair which he had mounted while warning the patrons, trampled upon and so seriously injured and burned that his condition for some time was critical.

The Lexington Avenue exit apparently was not used, as the smoke and fire were more severe on that side. More than 100 persons struggled or were

pushed down the stairway, which was between four and five feet wide. Confusion was increased when those who escaped attempted to return for their companions. A few men escaped by dropping from the windows and eight Chinese waiters made their way to the roof, from which they were taken down a fire department ladder.

Fire department officials expressed the opinion that had all the persons left promptly when the fire was discovered, no loss of life would have occurred. The body of the manager of the Chinese restaurant was found in the cashier's office, where he had returned after escaping from the building, to obtain the money in the cash register. Five other persons died in hospitals, bringing the total to nine. Most of the deaths were due to suffocation and injuries, resulting from the panic and efforts to escape, rather than to external burns.

Cloth decorations festooning the ceiling were blamed for the rapid spread of the fire and undoubtedly largely contributed to the panic. The fire department had no power to prevent the use of such decorations at the time of the fire, as the control of such matters was under the Building Department. The loss to the building and contents was estimated at $75,000.

Except for the flammable decorations, it is difficult to explain the panic and loss of life, as most of the factors usually associated with fires involving loss of life were not present in this case. The building apparently complied with standard requirements as to construction, enclosure of vertical openings and exit arrangements, except in a few details that had no bearing on this fire. The second floor restaurant had large and small plate glass windows facing on two streets and stairway capacity sufficient to empty the room in less than one minute.

While the cause of the fire was at first generally believed to be due to electrical origin, the investigation did not develop anything in support of that theory. Although convinced the fire was of accidental origin and despite the denials of witnesses examined, fire officials are of the opinion that smoking carelessness was probably the cause.

Fire Record of Dwellings.

Dwelling fires present the most serious and tragic aspect of the national fire waste, exceeding both in number and amount of loss the fires in any other occupancy classification. Dwelling fires likewise cause greater loss of life and personal injury than fires in any other class of property. Loss of life by fire in dwellings has been covered in detail in other records (see QUARTERLY, January, 1936, page 281) and is not further discussed in the present article. In addition to the losses reported in dollars, dwelling fires cause untold loss in the disruption of homes and the destruction of irreplaceable personal possessions. Both because of the magnitude of the problem and the relatively small unit values involved, the measures of fire prevention and fire protection that have been in recent years successfully applied to industrial, mercantile and public buildings have only to a very limited extent been applied in homes. The result has been that while losses have been decreasing in other classes of property the dwelling fires have contributed an increasing percentage of the total fire loss. It is, however, entirely practicable to decrease dwelling losses through measures such as more complete fire department protection, better control of the construction and equipment of buildings, and inspection programs as described on another page of this QUARTERLY.

Acme.

Palatial residences, as well as the most humble homes, frequently succumb to the ravages of fire and, because of the large values involved, contribute an important part of dwelling fire losses. The owners of such mansions should be well able to afford adequate fire protection, but such buildings are all too often of highly combustible construction, have wooden shingle roofs, and have no adequate water supply for fire extinguishment.

Acme.

Fire loss in dollars does not measure the suffering of families whose homes are visited by fire. A fire in the smallest home is just as much a tragedy as that in a million-dollar mansion. This fire, near Trenton, N. J., started when a woman, mistaking gasoline for kerosene, poured it into the kitchen stove. Two children were burned to death.

In the absence of complete national statistics of fire loss by classes of property, the following statistical analysis of dwelling fires has been made from reports of typical states and cities which publish detailed data. These reports, from state fire marshals, insurance commissioners, and municipal fire authorities, represent a population of about a third of the total population of the United States. While the basis of reporting is not uniform in all cases, the reports represent all sections of the country and the volume of data is sufficient to leave no doubt that the figures presented give an accurate cross section of the experience of the entire country. However, care should be exercised in comparing records of the individual states and cities which use different bases in the preparation of their reports. For the most part the state reports used in preparing this article are complete only through 1934, and in some instances reports are available only for a limited number of years. This record does not include apartment houses, tenements, rooming or lodging houses, as such occupancies present a quite different problem and are subject to more or less public fire prevention regulation not usually found in the case of dwellings.

From information covering the ten states and three cities listed in the following table an estimate has been made of the average annual fire loss in dwellings for the five-year period 1930 to 1934 inclusive. In estimating the

number of fires it has been assumed that only approximately one-third of th residents of New York City live in single family dwellings. On the basis o this table it is estimated that an average total of 166,000 fires, causing a los of approximately $97,093,000, have occurred in the United States annuall during the five-year period. Canadian figures furnished by the Dominion Fir Commissioner show an average of 32,205 dwelling fires a year, causing a annual loss of $11,837,609. The number of dwelling fires in Canada for th five-year period was 3.10 per thousand population, as compared with th estimate of 1.35 per thousand for the United States. This is explained by th fact that the Canadian figures include numerous trivial fires, for which the fir department was not called, while estimates for the United States include onl actual building fires.

Acme.

Stores on the first floor increase the fire hazard of the dwelling occupancy above. More than ten per cent of New York City dwelling fires originate in stores. This New York City fire shows the dense, suffocating smoke that frequently claims the lives of the occupants of dwellings of this class.

Acme.

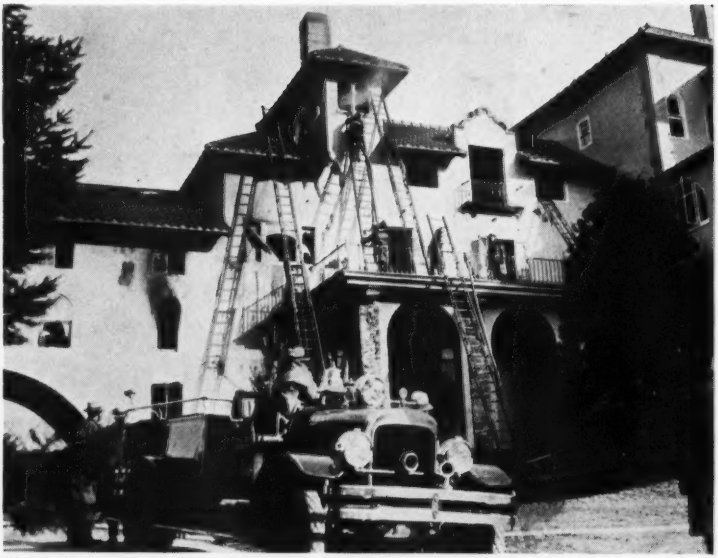
Nine per cent of dwelling fires are due to exposure from other burning buildings. This fire, in Hewlett, Long Island, N. Y., started by a gasoline blow torch, destroyed the building of origin and ignited the wooden exterior walls of three adjoining homes.

Annual Fire Record of Dwellings.

State or City	Population (1930 Census)	Average No. Fires (Five Years)	Average No. per 1000 Population	Average Loss (Five Years)	Average Loss per 1000 Population
Illinois	7,607,000	7,491	0.98	$4,927,567	$647
Indiana	3,225,000	3,585	1.11	2,966,778	919
Iowa	2,468,000	3,608	1.45	2,197,780	891
Kansas	1,880,000	1,753	0.92	1,199,605	640
Louisiana	2,094,000	3,171	1.51	2,062,892	986
Massachusetts	4,253,000	5,255	1.23	5,667,006	1,078
Oregon	952,000	3,715	3.90	1,479,168	1,576
South Dakota	691,000	472	0.68	331,152	479
Vermont	359,000	946	2.63	338,855	942
Wisconsin	2,930,000	2,685	0.91	3,057,555	1,041
Baltimore	805,000	3,754	4.65	259,754	323
New York	6,982,000	†3,997	0.57	.....	....
Philadelphia	1,964,000	2,206	1.12	408,119	208
Total	36,200,000	42,638	1.35	$24,895,731	$854
Estimated Total U. S.	122,700,000	166,000	1.35	97,093,000	854
Dominion of Canada	10,374,000	*32,205	3.10	$11,837,609	$1,132

*Includes claims for small fires damaging contents to which fire department was not called.

†This figure includes only dwellings. A large proportion of the residents of New York City live in apartment or tenement houses not included in this figure.



Keystone.

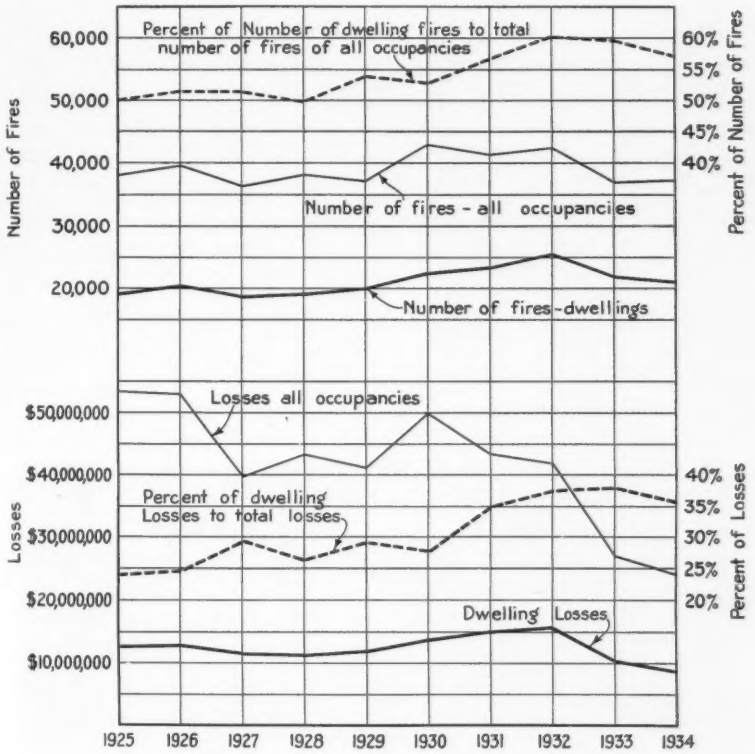
Substantial walls do not make a building fireproof. This fire, the fourth in ten years in this palatial Connecticut dwelling, started in a heater room at 4 A.M. The caretaker attempted to telephone the alarm, but before completing the connection the flames had burned off the wires. The caretaker had to drive to a near-by town to give the alarm. When the firemen arrived they had to pump through nearly a mile of hose, as there was no local water supply.

Trend of Dwelling Losses.

The following chart has been prepared to show the trend of dwellin losses for the ten-year period from 1925 to 1934 inclusive. This chart is base on the figures of five representative states and two cities which furnished com plete data for the period. States where the information was not comple for the entire ten years have been excluded. The following states and citie representing a total population of close to thirteen million persons, are i cluded in this chart: Iowa; Louisiana; Massachusetts; Oregon; Vermon Baltimore, Md., and Philadelphia, Pa.

It appears probable that the fire experience of the entire United Stat parallels that of this group, which represents a population of approximate ten per cent of that of the entire country. This assumption is confirmed b the fact that the curve of total losses in all occupancies, as shown on th chart, shows losses about ten per cent of the total national loss reported b the National Board of Fire Underwriters, with annual fluctuations similar the changes in the national totals.

As shown by this chart the number of fires in dwellings was greater in 1934 than in 1925, although there was a marked decrease during the last two years from the high years of 1930 to 1932. The number of dwelling fires has averaged well above half of the total number of fires reported for all occupancies. Dwelling losses have decreased much less rapidly than the losses in other occupancies, with the result that the ratio of dwelling losses to the total fire loss increased from 24.1 per cent of all losses for the group during 1925 to 35.7 per cent in 1934.



Number of Fires and Dwelling Losses.

This chart, compiled from records of typical states and cities having a population of about one-tenth that of the entire United States, is indicative of the national trend of dwelling fires and their relation to the total fire waste. The total losses of the states and cities included in this chart, Iowa, Louisiana, Massachusetts, Oregon, Vermont, Baltimore and Philadelphia, consistently approximate ten per cent of the U. S. total.

Dwelling Fires in Canada.

A ten-year record of dwelling fires and losses for the entire Dominion of Canada has been prepared from data contained in reports of the Dominion Fire Commissioner. This record shows that more fires occur in dwellings than in all other occupancies. In ten years the ratio of dwelling losses to the total Dominion fire loss has more than doubled until in 1934 well over a third of all Canadian fire loss occurred in dwellings.

Dwelling Fires — Dominion of Canada.

	Number of Fires			Losses		
Year	Dwellings	Total All Occupancies	Per Cent of Dwelling Fires to Total	Dwellings	Total All Occupancies	Per Cent Dwellin Losses to Tota
1925	19,166	31,757	60.3	$7,653,204	$40,729,724	18.8
1926	18,581	30,467	60.8	8,321,006	38,395,096	21.6
1927	19,304	31,728	60.9	7,830,925	32,254,084	24.3
1928	21,216	32,101	66.1	8,742,883	36,402,018	24.0
1929	22,461	35,590	63.0	11,436,385	47,499,746	24.0
1930	24,103	39,117	61.6	11,625,274	46,109,875	25.2
1931	*34,545	*49,284	70.0	13,504,212	47,117,334	28.7
1932	*35,624	*47,853	74.5	13,625,641	42,193,815	32.0
1933	*34,329	*46,166	74.4	10,475,843	32,676,314	31.9
1934	*32,426	*43,622	74.3	9,957,076	25,437,840	39.1
Total.....	261,855	403,301†	64.7	$103,222,448	$367,715,652	28.1

*Includes small fires for which insurance losses were paid, but for which the fire d partment was not called. Such fires, numerically, were omitted in former years, althou the loss was included.

†Adjusted total.

Acme.

Another palatial dwelling fire, typical of the many fires in large suburban homes in recent years. Even where adequate water supplies and public fire department protection are available and the alarm is given promptly, fire may sweep rapidly through large frame structures such as this, particularly under adverse weather conditions. Automatic sprinklers, where installed in large frame buildings of this kind, have a very favorable record of extinguishing fires in their incipiency.

Acme.

Expensive residential developments, though often utilizing masonry for appearance, are largely of wooden construction, and where the houses are closely spaced, fire may spread readily from building to building.

Average Loss per Fire.

The average loss per fire in dwellings varies considerably with local conditions, such as the type of construction, values involved and amount of fire protection available. There is also some difference in the basis of reporting fires. Some localities report all fires regardless of the size or whether any damage was incurred, while others report only fires with actual loss. City losses are lower because of the greater fire protection available. The following figures give the average loss per fire over a ten-year period in a typical group of states and cities. The fact that Philadelphia with more than twice the population of Baltimore reports less dwelling fires would seem to indicate a difference in the basis of reporting fires. The figures, however, present an indication of the size of loss in the average dwelling fire both in cities and states.

Average Loss per Fire in Dwellings.
(Total 1925-1934)

State or City	Total No. of Fires	Total Loss	Average Loss per Fire
Iowa	35,686	$25,261,846	$708
Louisiana	31,996	22,059,854	689
Massachusetts*	48,758	52,515,156	1,078
Oregon	31,769	13,319,074	420
Vermont	6,472	3,021,072	467
Baltimore	34,072	3,109,618	91
Philadelphia	22,035	5,271,417	239
Group Total	210,788	$124,558,037	$591

*Includes apartment houses but not boarding and lodging houses.

International.

On the night of Feb. 14, 1936, two men were sleeping on the first floor and two boys in the attic of this Yonkers, N. Y., dwelling. A kerosene heater, near the window in the center of the picture, had been left burning. At about 1 A.M. on Feb. 15 the heater exploded, scattering burning kerosene. The two men fell a short distance from their beds, and the body of one of the boys was found near the bottom of the attic stairs. The other boy escaped over the porch roof.*

Building and Contents Losses.

The division of the dwelling loss between buildings and contents is shov by ten-year figures of two representative states and two cities. In the citi the losses to contents are somewhat higher than in the states. This may explained by the fact that where good public protection is available, fir damaging house furnishings are often controlled before extensive structur damage results. In the United States as a whole structural damage is probab slightly under three-quarters of the total dwelling loss.

Division of Losses Between Buildings or Contents.
(Most Recent Ten-Year Totals)

State or City	No. of Fires	Buildings Loss	Buildings Per Cent	Contents Loss	Contents Per Cent	Total Lo
Baltimore, Md.....	34,072	$1,968,569	63.4	$1,141,049	36.6	$3,109,6
Iowa	34,810	17,512,011	74.7	5,941,265	25.3	23,453,2
Massachusetts	48,758	39,252,332	74.8	13,262,824	25.2	52,515,1
Philadelphia, Pa.....	22,035	2,793,659	53.0	2,477,758	47.0	5,271,4
Total.....	139,675	$61,526,571	73.0	$22,822,896	27.0	$84,349,4

*Report from Hubert Abbe Howson (Member N.F.P.A.).

Causes of Dwelling Fires.

The following tables are presented to show the causes of fires in dwellings. The table on page 332 gives the number of fires and total loss reported for each cause over a five-year period in the states of Kansas and Louisiana and for a two-year period for the state of Oregon. These three states use a similar system of classification and are therefore presented together. The state of Massachusetts and the city of Philadelphia use more detailed classifications showing number of fires attributed to each cause, but do not report the losses from each cause. In all of the tables smoking and matches and defective chimneys are outstanding fire causes. In the table showing the states of Kansas, Louisiana and Oregon, the greatest number of fires from any single cause is attributed to "sparks on roof," again illustrating the need of fire-retardant roof coverings for dwellings. Cause tables for the state of Massachusetts and the city of Philadelphia do not segregate roof fires from other fires caused by sparks.

Acme.

The owner of this luxurious 43-room dwelling on Long Island, New York, had refused an offer of $2,000,000 for the estate, which included many valuable art treasures. The fire started from defective wiring in a pipe organ valued at $150,000 and spread rapidly through the structure. The building was half a mile from the main road, and the two private hydrants provided a totally inadequate water supply.

Causes of Dwelling Fires — Kansas, Louisiana and Oregon.

CAUSE	NUMBER OF FIRES						LOSS					
	KANSAS 1929-1933	LOUISIANA 1930-1934	OREGON Farm (1933-1934)	OREGON Urban Total)	TOTAL No.	TOTAL Per Cent	KANSAS 1929-1933	LOUISIANA 1930-1934	OREGON Farm (1933-1934)	OREGON Urban Total)	TOTAL Loss	TOTAL Per Cent
Chimneys, flues, overheated or defective	1,633	916	165	790	3,504	11.3	$1,205,207	$541,406	$179,612	$163,809	$2,090,034	11.4
Electricity or defective wiring	490	390	25	238	1,143	3.7	416,916	340,599	33,226	76,829	867,570	4.7
Explosions	77	39	8	27	151	.5	84,653	36,651	3,867	17,615	142,786	.7
Exposure	204	2,457	27	249	2,937	9.5	67,522	801,151	15,168	45,922	929,763	5.1
Fireworks	30	44	2	12	88	.3	4,313	4,141	82	594	9,130	.0
Friction	.....	4	2	1	7	.0	.....	1,034	34	17	1,085	.0
Gas	67	330	.....	.....	397	1.3	27,257	219,525	.....	.....	246,782	1.4
Hot ashes, coals, open fires	36	1,075	42	517	1,670	5.4	3,971	275,327	29,683	37,520	346,501	1.9
Hot grease, oil, tar, wax, asphalt, ignition of	40	113	13	300	466	1.5	16,612	8,352	3,539	21,310	49,813	.3
Hot metals, including electrical appliances	.....	.....	6	383	389	1.2	.....	.....	238	21,659	21,897	.1
Hot irons	.....	387	.....	.....	387	1.2	.....	85,902	.....	.....	85,902	.4
Incendiarism	164	680	18	78	940	3.1	99,725	1,138,797	48,467	61,100	1,348,089	7.4
Lightning	97	354	6	16	473	1.5	130,719	53,830	4,644	5,911	195,104	1.0
Matches and smoking	413	1,771	44	1,202	3,430	11.1	83,554	504,373	24,663	114,785	727,375	4.0
Open fires	92	.....	.....	.....	92	.3	18,863	.....	.....	.....	18,863	1.0
Open lights	90	475	6	144	715	2.3	39,848	83,365	3,539	15,561	142,313	.7
Petroleum and its products	215	1,026	18	89	1,348	4.4	114,868	584,971	13,399	20,447	733,685	4.0
Rubbish and litter	100	187	.....	14	301	1.0	25,017	38,332	.....	1,435	64,784	.3
Sparks from combustion	108	53	.....	.....	161	.5	34,518	27,922	.....	.....	62,440	.3
Sparks from machinery	8	.....	.....	.....	8	.0	6,071	.....	.....	.....	6,071	.0
Sparks on roofs	1,791	1,383	145	506	3,825	12.4	421,793	362,841	139,425	95,270	1,019,329	5.5
Spontaneous ignition	124	83	13	61	281	.9	88,677	97,701	22,555	40,015	248,948	1.3
Steam and hot water pipes	.....	4	.....	.....	4	.0	.....	6,015	.....	.....	6,015	.0
Stoves, furnaces, boilers and their pipes	1,026	687	63	401	2,177	7.1	603,347	445,712	59,635	80,593	1,189,287	6.5
Miscellaneous known causes	287	69	.....	16	372	1.2	118,146	22,589	.....	2,494	143,229	.7
Unknown Causes	1,673	3,347	172	459	5,651	18.3	2,386,418	4,633,939	228,613	283,638	7,532,608	41.3
Total	8,765	15,874	775	5,503	30,917	100.0	$5,998,015	$10,314,475	$810,389	$1,106,524	$18,229,403	100.0

Acme.

A painter's blow torch used for burning the paint from the outside walls of this Los Angeles dwelling started a fire just under the eaves, and soon spread into the attic and involved the redwood shingle roof. Due to the prompt response of the fire department, and the use of 1½-in. hose lines to minimize water damage, the loss was limited to $500.

Five lives were lost in an early morning fire in this Boston dwelling on May 7, 1935. Supposedly due to an electrical appliance left in circuit during the night, the fire spread to fatal proportions before discovery. After this fire automatic fire alarms were installed in many similar dwellings in the neighborhood.

Unknown Causes.....	1,673	3,347	.....	16	372	1.2	118,146	22,589	.....	2,494	143,229	.7
Total.....	8,765	15,874	775	5,503	30,917	100.0	$5,998,015	$10,314,475	$810,389	$1,105,524	$18,229,403	100.0

Acme.

Frame row dwellings, built without fire walls between units, are peculiarly susceptible to damage by spreading fire. This Brooklyn, N. Y., fire involved thirteen homes before it was brought under control.

Causes of Dwelling Fires — Philadelphia, 1930-1934.

Cause	Five-Year Total	Per Cent
Alcohol explosions (private stills)	26	.2
Boiling lard, oils, etc.	305	2.8
Candles	173	1.6
Chimneys (foul)	766	7.0
Cigarette and cigar stubs	528	4.8
Defective flues	524	4.8
Electricity	557	5.0
Electric irons	222	2.0
Explosions, other than petroleum	40	.4
Fireworks	7	.1
Gas jets	44	.4
Gas ranges and heaters	210	1.9
Heaters (coal)	215	1.9
Hot ashes and coals	345	3.1
Incendiary	32	.3
Incendiary (supposed)	17	.1
Lightning	28	.2
Matches	2,303	20.9
Motors, electric (overheated)	7	.1
Rubbish ignited	570	5.2
Smoking	708	6.4
Sparks from chimneys, stacks, etc.	294	2.7
Spontaneous ignition	18	.1
Stoves (coal)	464	4.2
Thawing pipes	82	.7
Petroleum Products:		
Fuel oil burners	208	1.9
Gasoline lamps and torches	85	.8
Gasoline explosions	179	1.6
Kerosene oil lamps and stoves	398	3.6
Miscellaneous known causes	15	.1
Unknown causes	1,550	14.1
Total	11,032	100.0

International.

This old frame dwelling was so dilapidated that when it caught fire the structure collapsed before the occupants could escape. A woman was killed and several firemen were severely injured. Many cities have initiated systematic programs for condemning and removing old structures no longer safe for human habitation.

Acme.

A metal or other fire-retardant roof covering, in addition to resisting falling firebrands, tends to confine an interior fire and prevent the rapid release of brands to ignite other dwellings, such as the old building with a wooden shingle roof shown at the left of this picture. This fire occurred in Hyattsville, Md., Nov. 19, 1935.

Causes of Dwelling Fires — Massachusetts, 1930-1934.

Cause	Five-Year Total	Per
Boiling over of fats, etc.	353	1
Burning soot	317	1
Careless fumigation	27	
Careless smoking	4,689	17
Careless use of matches	1,885	7
Children and matches	1,538	5
Defective chimney	2,923	11
Defective construction	56	
Defective heating apparatus	153	
Defective heating apparatus (oil burning)	336	1
Electrical causes	1,548	5
Escaping gas ignited	80	
Explosion of lamp, lantern or stove	267	1
Fireworks	286	1
Friction	10	
Gas and electric irons	366	1
Grease in ventilator igniting	5	
Heating or lighting apparatus igniting contents	1,412	5
Hot ashes	672	2
Incendiary	546	2
Lighting fire with kerosene or gasoline	24	
Lightning	316	1
Malicious mischief	207	
Mechanics' torches	147	
Miscellaneous	36	
Overheated cooking or heating apparatus	1,032	3
Range oil burners	253	1
Rats and matches	172	
Sparks from bonfires, forest fires	275	1
Sparks from chimneys	1,446	5
Sparks from furnaces, forges, stoves, etc.	418	1
Sparks from locomotives	24	
Spontaneous ignition	1,253	4
Thawing water pipes	326	1
Unknown	1,538	5
Unknown, suspicious	522	2
Volatile oils and flammable liquids, ignition of	817	3
Total	26,275	100

Point of Origin of Fires.

The annual report of the New York fire department contains a showing the locations in which fires originate. These figures which include private dwellings are probably typical of the experience in other although in New York there is undoubtedly a greater proportion of dwe having stores on the first floor. The latest four years for which repor available have been used in preparing the following table. As mig expected, the greatest number of fires started in basements and kit Bedrooms also figured in a large number of fires. More than eleven per c the fires started on roofs, porches and other outside locations.

International.

Fires in the dead of winter cause untold suffering when families are forced to abandon their homes, often without time to save even adequate clothing. This fire occurred in East Meadow, Long Island, N. Y., in December, 1935. Note furious burning of wooden shingle walls and lack of flame on the asphalt shingle roof. Garden hose (man at left) is valuable if used before fire extends beyond the incipient stage, but is obviously futile after fire gains headway.

Point of Origin of Dwelling Fires, New York City.

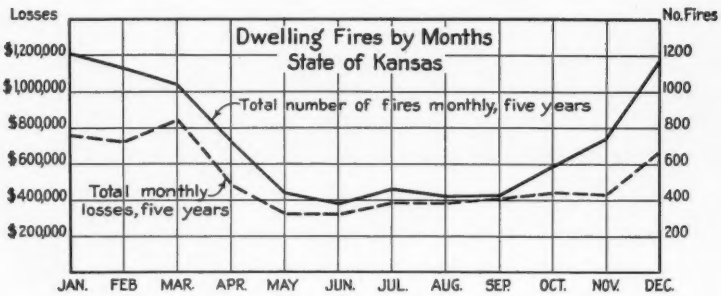
Point of Origin	Four-Year Total*	Per Cent
Areaways, porches, roofs, etc.	1,827	11.3
Airshafts	38	.2
Attics	176	1.1
Awnings	439	2.7
Bathrooms and toilets	133	.8
Bedrooms	1,620	10.1
Boiler and furnace rooms	345	2.2
Cellars	2,626	16.3
Chimney fires	361	2.3
Closets	678	4.2
Defective flues	856	5.3
Dining rooms	880	5.5
Dumbwaiter and elevator shafts	81	.5
Hallways and corridors	397	2.5
Kitchens	2,159	13.4
Parlors	1,198	7.5
Partitions, under floors, etc.	173	1.1
Storerooms	106	.7
Stoves	1,704	10.5
Vacant floors	225	1.4
Miscellaneous	60	.4
Total	16,082	100.0

*Figures for years 1930, 1931, 1932, 1934. Figures for 1933 not available.

Gasoline and other flammable liquids used for home dry cleaning are responsible for the loss of many lives, and cause three per cent of the number of dwelling fires according to the reports of the Massachusetts state fire marshal. This Boston dwelling fire started with an explosion of gasoline used for dry cleaning in the basement, and spread rapidly through the building.

Dwelling Losses by Months.

It is a well-known fact that fire losses are greater during the winter months. However, it is interesting to observe the seasonal fluctuations in dwelling house fires and losses. Such figures are available for the state of Kansas and are presented in the form of a chart to show the total number of fires and loss experienced during each month over a five-year period.



Municipal Group Classification of Fires.

The last table is presented to show the relationship between dwelling fires in cities, towns and in the country. The state of Indiana has been selected as typical of other sections of the country. These figures are totals of the four-year period 1929 to 1932 inclusive, which are the latest years for which figures are available.

More than half of the dwelling loss in Indiana occurred in rural areas. The ratio of dwelling losses to the value of property involved was 68.0 per cent in rural areas as compared with but 6.6 per cent in cities of over 5000 population. This high loss ratio is largely typical of the experience in the rural sections of other states and illustrates the need of more extensive rural fire department service and of private protection for rural property. The loss

International.

Wooden rear additions and porches, extending into congested and inaccessible areas in the center of city blocks, are found in many cities where substantial brick construction is required for the main structure of dwellings. Such conditions make for the easy spread of fire, as in the case of this Philadelphia fire, which occurred on Oct. 1, 1935.

International.

Ruins of a two-story dwelling in North Plainfield, N. J., after the fire of Oct. 18, 1933, in which two children were burned to death. The fire started when a man used gasoline or kerosene to start a fire in a stove located at the foot of the only stairs to the second floor. All the other members of the family were upstairs at the time. The four saved escaped by jumping from the second story windows.

ratio of towns under 5000 was 19.0 per cent. Such towns are generally und volunteer fire department protection. It seems reasonable to assume that such protection were more generally extended to rural areas the loss ratio such areas would be greatly reduced. Although only 23.1 per cent of t Indiana dwelling fires occurred in rural areas, the resulting loss was great

Indiana Dwelling Fires, Municipal Group Classification.

(Totals 1929-1932, inclusive)

	Cities over 5000 Population	Per Cent of State Total	Towns Under 5000 Population	Per Cent of State Total	Rural Areas	Per Cent of State Total	State Totals
Number dwelling fires	8,245	56.5	2,981	20.4	3,365	23.1	14,5
Number of fires, all occupancies	12,382	52.6	5,237	22.2	5,933	25.2	23,5
Per cent of dwelling fires to total	67.0		57.0		56.7		61.7
Total dwelling losses	$3,384,819	29.1	$1,866,894	16.0	$6,384,302	54.9	$11,656,0
Total losses, all occupancies	12,628,217	38.9	5,836,926	17.9	14,007,261	43.2	32,472,4
Per cent of dwelling losses to total	26.8		31.9		45.5		35.9
Value of dwellings involved	$50,947,121	72.6	$9,800,973	14.0	$9,383,691	13.4	$70,131,7
Per cent of value destroyed	6.6		19.0		68.0		16.5

than the combined dwelling losses of all the cities and towns in the state. Rural dwellings, comprising only 13.4 per cent of the value of the dwellings involved in fires, suffered 54.9 per cent of the state dwelling loss. City dwellings, representing 72.6 per cent of the value of dwellings involved, suffered only 29.1 per cent of the total dwelling losses.

As a further illustration of the large dwelling losses occurring in rural areas the experience of the state of Oregon for the years 1933 and 1934 might be cited. The average loss per dwelling fire in incorporated cities and towns in Oregon was $201, while in rural areas the average loss was $1046. During a two-year period 12.3 per cent of the dwelling fires were in rural sections, and these fires caused 42.2 per cent of the dwelling losses in that state.

F. W. Tupper.

With no hydrants within half a mile, and a 50-mile per hour wind blowing, there was nothing to do but watch this fire burn. Fires such as this can be extinguished with small loss if standard fire extinguishers are available, and are intelligently used at the start of the fire.

Dwelling Inspection by Fire Departments

By M. S. Blake,
Field Engineer, N.F.P.A.

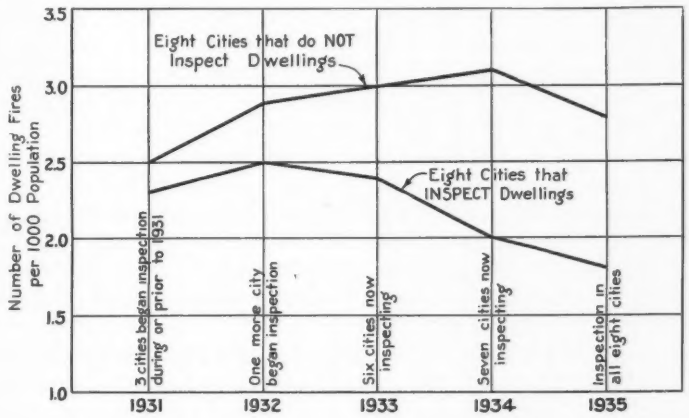
The increasing attention to the elimination of home fire hazards in citi is one of the most gratifying developments in the field of fire waste reductio Recognition of the importance of special fire effort to prevent fires in dwellin follows a general increase in the number of dwelling fires in the United Stat during the past ten years. Two-thirds of all fire fatalities now occur residences.

For some years past fire departments in most cities have been fire preve tion agencies as well as fire extinguishing organizations. They have sent th uniformed forces into buildings armed with special authority to inspect f hazards, but until recent years this work has been largely confined to pub and business properties. Several apparent difficulties have been responsib for not including the private residence in the inspection program, though fi in this occupancy in practically all cities regularly outnumber the fires in oth buildings. Chief among these is the common idea that "a man's house is h castle" and laws limiting the legal power of fire departments to enter dwellin except in special cases. Some undermanned departments also regarded fi prevention visits to a large number of dwellings as too great an undertaki to be made a part of their routine inspection program. These difficulties, ho ever, have finally been overcome by progressive fire chiefs determined to ste the rising tide of home fires in their communities, and an increasing number cities are now extending their fire department inspection service to homes.

It has been clearly established that a well-publicized dwelling inspecti campaign carried out by uniformed firemen may be successfully introduc in any city without necessity for invoking the law. Experience has shown th it is the exceptional householder who will not welcome helpful advice to pr vent loss of lives and property in his home by fire, and refusals of admittan to firemen making a proper approach have been rare. Although conduct wholly on a basis of courtesy rather than law, the service soon becomes a accepted one in the community and its continuation in subsequent yea ceases to require the explanatory publicity usually necessary when the inspe tion is first started. Moreover, lack of a large fire department personnel ne not be a serious hindrance to comprehensive inspection of dwellings. In number of cities, large and small, faced with this problem the firemen ha been convinced of the public good will and prestige which accrue to t benefit of their department and themselves from this service to the great body of citizens and have willingly volunteered some off-day time for it.

Some of the cities in which the fire department has carried out an organized fire prevention inspection of dwellings are: Cincinnati and Middletown in Ohio; Berkeley, Calif.; Oklahoma City, Okla.; Grand Rapids, Mich.; Omaha, Neb.; St. Paul, Minn.; Erie, Pa.; Dallas and Fort Worth in Texas; Memphis, Tenn.; Parkersburg, W. Va.; Providence, R. I.; Worcester, Springfield, Salem, Arlington, Everett, Peabody, Brockton and Chelsea in Massachusetts. In most of these cities the inspection of homes is made regularly each year or oftener, and in some it has now become a continuous routine.

The question has been raised as to the actual results accomplished by this rather new development. To secure a definite measure of its effectiveness a study was made to determine the dwelling fire experience during the past five-year period of a group of cities in which all homes are inspected for hazards in comparison with the similar fire record of another group which has not as



yet adopted this service. The result shown in the accompanying chart appears to be ample evidence of the substantial civic benefit obtainable from this sort of fire prevention activity. Cities included in the study, eight in each group, were chosen solely for the reason that the required data as obtained from fire department records were available for the desired period. There are some differences in physical characteristics of these cities, but the averages of the two groups seem to be properly comparable. The group of eight cities which inspect dwellings comprises a total population of approximately 1,700,000 persons and includes: Cincinnati, Ohio; Providence, R. I.; Dallas, Texas; St. Paul, Minn.; Berkeley, Calif.; Worcester, Springfield and Everett, Mass. The group in which dwellings do not receive a general inspection by firemen has an approximately equal total population of 1,690,000 and also includes eight

cities. These are: Milwaukee, Wis.; Minneapolis, Minn.; Richmond, V
Bridgeport, Conn.; New Bedford, Mass.; Charlotte, N. C.; Lansing, Mic
and Elmira, N. Y.

The usual procedure followed in making an organized fire hazard insp
tion of dwellings by firemen varies somewhat in different cities, but its essent
features are much the same. The highly successful methods employed
Providence, R. I., a city of 250,000 population, are typical. The initial ca
paign was inaugurated there by Fire Chief Frank Charlesworth in 1930 a
may well serve as a helpful illustration for other cities of any size. Convinc
of its feasibility, the Chief sought and received the enthusiastic coöperati
of the fire prevention committee of the Providence Chamber of Commerce a
a series of meetings was held to work out the details of the program.
attractive illustrated leaflet explaining common fire hazards of the home a
a small window card with the inscription "We Are Working with the Pro
dence Fire Department to Fight for Fewer Fires" were designed and print
It was decided to confine the inspection to basements. The campaign w
opened in late September, just prior to Fire Prevention Week and for t
first week stories were carried by the newspapers with local dwelling fire stat
tics, showing the need of the plan and explaining it with special emphasis
its purely educational purpose for public benefit free from any compulsion
threat to property owners.

Firemen were asked to volunteer off-day time and responded to a m
to the appeal. All were carefully instructed as to how to proceed with th
task. The men were assigned to work in pairs and 150 a day were availa
for inspection throughout the campaign, which required six weeks to visit
of the 77,000 homes in the city.

In making their rounds two firemen called at the back door of the hou
and asked permission of the housewife to make a fire inspection of the ba
ment. She was asked to accompany them if her time would permit. Only t
usual simple hazards found in basements were investigated. Hazards not
were pointed out at the time of inspection and corrections suggested. T
literature on home fire hazards was then distributed.

From the start of the campaign it was evident that the idea had the f
support of the general public. Firemen were refused admittance to only 2
homes, a fraction of one per cent of the total number. Many home owne
unwilling that the firemen should find a dirty or hazardous condition, h
anticipated their visit by cleaning up the basement before they arrived.

With public support for this service thus firmly established, its repetiti
presented no difficulty and the original campaign has now become a regu
annual feature of fire prevention work in that city. The following dwelling f
record of Providence speaks for its benefits more eloquently than words.

Number of Dwelling Fires, Providence, R. I.

Before Start of Inspections	Since Start of Inspections
1926 — 610	1931 — 413
1927 — 478	1932 — 374
1928 — 477	1933 — 296
1929 — 544	1934 — 292
1930 — 549	1935 — 287

Dwelling Fire Loss.

1926-1930	$709,800	1931-1935	$397,700

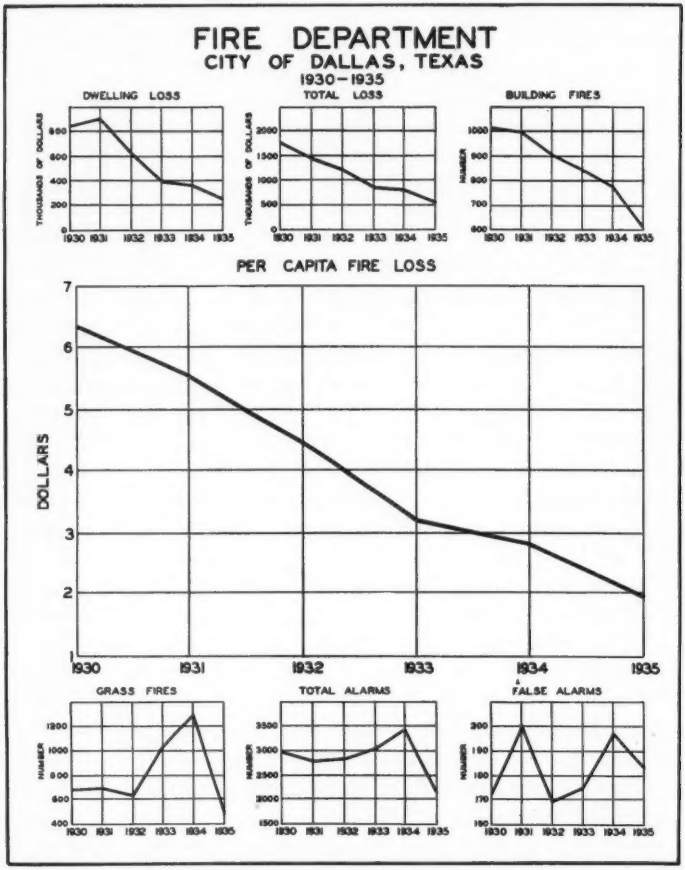
There are many other equally commendable examples of diminishing dwelling fire waste among the cities which have executed similar plans for attacking this problem. The fire department in the smaller city of Everett, Mass., adopting a practice of inspecting all dwellings by the firemen in 1933 continues to carry this out semi-annually with the following notable results.

Year	No. of Dwelling Fires	Dwelling Fire Loss
1930	83	$86,786
1931	65	82,963
1932	101	88,001
1933	42	41,249
1934	57	43,099
1935	34	55,888

In Cincinnati for many years the fire department included in its regular fire hazard inspection program a small proportion of the city's residential occupancies. In 1934 the excessive number of fires and loss in dwellings brought about a change in the work to provide continuous inspection of all residence properties throughout the city by members of fire department companies in their own districts. The following table shows the relation between the annual number of inspections and number of fires in dwellings in Cincinnati. The immediate reduction of approximately 50 per cent in dwelling fires after the change was made in 1934 is striking.

Year	Dwellings Inspected	Dwelling Fires
1926	663	922
1927	8,394	788
1928	8,150	951
1929	8,619	992
1930	9,613	1,113
1931	7,292	916
1932	9,717	984
1933	10,697	1,013
1934	81,052	522
1935	78,288	488

The following dwelling fire experience of Dallas, Texas, reveals a steadily progressive improvement in a city's record made with the assistance of sys-



A fire department must make an effective presentation of fire loss data in its annu report. There are a large number of statistics which might be included, but to secure atte tion it is usually necessary to mention only the more important items. The fire depar ment of Dallas has on its staff a research man under whose direction the above chart w prepared. It meets particularly well the requirements of an annual report, as it presen the basic statistics which show whether or not the fire department is securing results a making progress. Note that arrangement of the charts, the scales and lettering are such to permit reproduction, without special treatment, on a newspaper page or on a sing page of a printed report.

tematic and continued inspection of all residence buildings over a period of years, when dwelling fires in other cities were on the up-grade. The Dallas Fire Department has carried on this activity regularly for the past six years, conducting it each year just prior to Fire Prevention Week.

Year	Number of Dwelling Fires	Dwelling Fire Loss
1930	642	$849,215
1931	690	894,136
1932	584	603,006
1933	530	399,138
1934	497	358,180
1935	413	264,848

Organized fire hazard inspection of dwellings in addition to other buildings is a logical part of a fire department's service to its community for fire prevention and fills a widespread need which has long existed. It has a particular advantage of being an inexpensive measure for any city to adopt. In every instance this practice has added practically nothing to the fire department budget. Proof of its value in dollars and cents return to a community at large is shown by the illustrations in this article of the resulting decline of fires with their damage to the homes. The rapid acceptance of the practice in a short time by cities in all regions of the United States is in itself evidence of its practicability and its value, both economically and for preservation of lives.

Lakewood, N. J., Hotel Fire.

Report by Schedule Rating Office of New Jersey,
(Member N.F.P.A.).

Sixteen persons lost their lives and seven others were seriously injur when an early morning fire destroyed the Victoria Mansions Hotel in Lak wood, N. J., on the morning of February 12, 1936. The hotel involved was o of several seasonal hotels largely frequented by residents of New York Ci Factors combining to cause the large loss of life were quick burning co struction, delay in giving the alarm, panic on the part of the guests and th lack of knowledge of fire escapes. The fire department was first called by occupant of a hotel across the street, but not until the front of the Victo Mansions Hotel was almost completely involved.

Construction and Protection.

The hotel was a 56-room, three-story and basement, frame building wi stuccoed exterior, erected ten years ago under the name of the Embassy Hot Details are lacking as to the interior arrangement, but it appears that stairwa were not enclosed and that the finish and furnishings, as well as the constru tion, were of quickly combustible material. At the time of the fire there we fifty-five persons in the building, including thirty-seven guests and eighte employees and members of the proprietors' families. The guest rooms we located on the second and third floors. Some of the employees had rooms the first floor.

In addition to the front and rear stairways the building was provided w three outside steel fire escapes. One fire escape was located at the rear a two were located on the south side of the building. All third floor rooms r served by an outside fire escape were provided with rope fire escapes. As as could be determined, only one of the ropes was used. In addition to the f escapes the building was equipped with an inside alarm system of the manua operated break-glass type, fire extinguishers, and two standpipes with outl on each floor provided with one hundred feet of hose at each outlet. The ho was inspected by the local building inspector on November 5, 1935, and w found to comply with local zoning and building laws relating to fire protecti

The public fire department consisted of five volunteer companies eighty active members and equipped with one pumper, an aerial ladder a three combination hose and chemical trucks. One paid man was on continuo duty at fire headquarters and drove one of the trucks. In addition to active members there were a large number of "exempt" members available duty at large fires.

F. W. Tupper.

The front entrance of the hotel after the building was largely destroyed. The fallen beams which may be seen through the doorway blocked access to the lobby early in the fire.

Story of the Fire.

The first alarm was turned in by telephone at 6:40 A.M., by the daughter of the owner of the Blumencranz Hotel directly opposite the fire. A general box alarm was turned in about ten seconds later from a box one block distant from the burning building and brought all the fire companies in town. Mr. Blumencranz and his daughter stated that at the time of the alarm, smoke was pouring very heavily from the second and third floors in the center of the building over the lobby and people were already jumping from windows. The fire spread rapidly after this, and early arrivals, including a police sergeant, who saw smoke and started for the fire before the alarm sounded, reported that the front exit was cut off when they arrived. Although it seems obvious that the fire must have been burning for some time, delivery men reported passing the hotel five minutes before the fire was discovered without seeing anything wrong.

The police sergeant upon arrival made several trips into the building by means of the rear stairway. Although the smoke was very dense he was able to carry three women from the building, whom he found overcome in the hallways. The officer is reported to have stated that several employees appeared more concerned with saving their own property than the rescue of the guests. He stated that he asked a hotel musician to assist him in the rescue work and later found him carrying out a bass drum.

The paid driver of the fire department stated that on arrival no attempt was made to get water on the fire due to the need of saving lives. Difficulty

was experienced in the use of the ladder truck because of telephone and li wires surrounding the building. Three persons were saved by ladders bef the ladders caught fire and were rendered useless. The driver also stated t when he arrived one of the second floor beams had fallen, blocking the fr entrance. A stiff southwest wind which was blowing spread the fire rapidly a blew smoke through the building. Other persons stated that fifteen minu elapsed before all the apparatus in the town arrived at the fire, but this is s to have had little bearing on the loss of life, as most of the victims are belie to have been trapped before the alarm was given. The exact time at which ladder truck arrived is not certain from available information.

Cause of Loss of Life.

Three men, nine women and four children lost their lives in the fire, a seven other occupants were seriously injured. Four of the victims died of bu and injuries after jumping from the burning building. The others were trapp inside and their bodies were later removed from the ashes of the buildi Very little rescue work could be done by the fire department due to the gr headway of the fire before the alarm was given.

There were several conflicting rumors concerning the internal alarm s tem. One was that an employee broke the glass and set off the alarm, think that it would call the fire department. The most logical theory was that

F. W. Tupper.

View of north side and rear of the burning Victoria Mansions Hotel take after rescue attempts had given place to fire fighting operations. The aeria ladder had been backed from the building due to the danger of falling walls. Th iron fire escape at the rear of the hotel is visible. Hanging from a second floo window in the center of the picture is a rope of sheets by which one occupan escaped.

wires of the system had been burned before an attempt was made to operate the system.

Inquiry as to why employees failed to sound an alarm indicated that employees may have all been in the kitchen and did not know of the fire. It is also possible that, in an attempt not to alarm the guests, the fire was fought by private inside equipment. Due to the complete destruction of the building standpipe valves could not be located following the fire to verify this theory. It does not seem probable that the manager intentionally delayed the alarm, as his son and brother were lost in the fire.

Despite the quick burning construction and lack of protection of vertical openings it appears that there were sufficient exits to permit the occupants to escape without loss of life if all occupants had been immediately notified through the operation of the local alarm system. With no employees continuously on duty during the night and early morning hours, and with no prearranged plan for action in case of fire, this failure of the human element is understandable. An automatic fire alarm system, or an automatic sprinkler system is designed to function in a case such as this, irrespective of the human element.

Cause of Fire and Loss.

Several conflicting theories as to origin of the fire have been advanced. One stated that the fire occurred in a guest room on the second or third floor, due to careless smoking. Early arrivals stated that the fire appeared to be chiefly confined to the upper floors. All agreed that no fire was visible in the basement. The theory advanced by the fire chief is that the fire started in the lobby on the first floor. This is a likely possibility, as the fire had great headway at that point. It appears that the hotel did not maintain night watch or desk service. The hotel, valued at $100,000, was a total loss. Insurance amounting to $37,000 was carried.

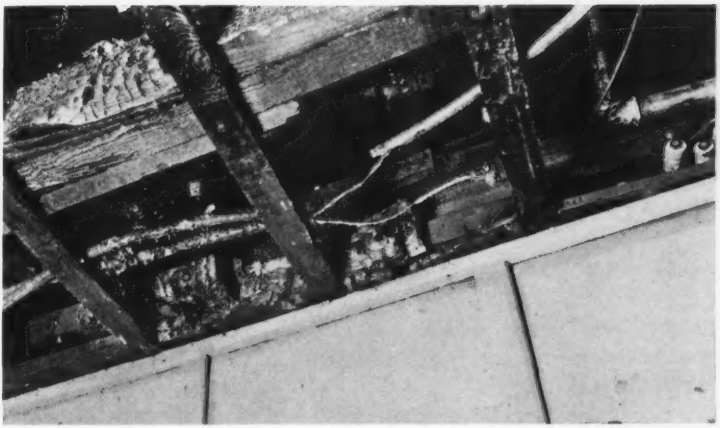
Westfield, Mass., Inn Fire.

The Van Deusen Inn, a three-story residential hotel in Westfield, Mas was practically destroyed by fire during the night of January 5, 1936, with loss of seven lives and a property loss of approximately $50,000. Of the residents present, four women and three men were burned to death and fi other persons were seriously injured. Several difficult escapes were made those saved. Delayed discovery of the fire, which spread rapidly throu inferior construction, and the lack of adequate private fire protection a proper exit facilities, were the factors responsible for the loss of life.

Built in 1911, the inn was three stories and basement in height, with one-story ell at the rear, and contained some 35 rooms. The construction w wood frame with brick veneered exterior walls. Floors and roof were of wo and ceilings of sheet metal. Room and corridor partitions were largely of wo sheathing or combustible wall board. Floor, roof and wall spaces were n firestopped and vertical openings were unprotected. The wiring was of o style knob and tube type concealed in floor and partition spaces.

The Van Deusen Inn in Westfield, Mass., after the fire of January 5, 1936 which took seven lives and seriously injured five others. Several of those rescue were taken down fire department ladders from the roof on which the fire escap terminates. This building had a substantial exterior appearance, but a fire tra interior.

NOTE: This account has been prepared from data furnished by the Massachusetts F Marshals Department and by the Westfield Fire Department, supplemented by perso observations of the N.F.P.A. Field Engineering staff.



The point of origin. Dripping moisture from pipes above was thought to have rotted the insulation of the electric wires shown. Contact of wires with each other or with the metal ceiling, which was directly below them, is believed to have caused the fire.

A fire-resistive heater room in the one-story rear ell and separated from the main building by a fire wall was not involved in the fire. The basement area contained the kitchen, dining room, laundry and some other usual basement occupancies. The three upper floors were arranged similarly, with guest rooms on either side of a central hallway running the length of the building. The lobby and office space was at the front of the first floor.

Interior exits were two stairways on the same side of the building, one near the front and the other at rear. Stairs were of wood and only partially enclosed in wire lath and plaster partitions. The front stairway was entirely open at the first story. Exterior exits were two narrow ladder-type fire escapes leading down from the top story. One of them ended at the front porch roof and the other at the roof of the one-story ell at the rear.

Fire protection facilities consisted of two hand fire extinguishers on each floor. An electric circuit operated by a push button in each story to sound a bell on every floor simultaneously had been installed for a fire alarm.

Story of Fire.

As most of the guests were elderly persons and had retired early, the front door was locked at 10 P.M. The fire was discovered at 10:20 P.M. Starting from defective wiring in the concealed space between the ceiling of the basement and the floor of a lavatory in the first story, it traveled laterally for some distance, then spread up through hollow walls and partitions to other floors before breaking out in corridors and rooms. The initial discovery was probably made by a lady resident on the first floor who investigated a glow

showing at her transom to find flames coming from the corridor ceiling, whic was a full story above the point of origin of the fire and near the opposi end of the building from it. Evidence of the speed of fire travel was reveale in testimony given at the state fire marshal's inquest, indicating almost simu taneous detection of the fire by several persons on the first and second floor They shouted alarms and ran to arouse other guests. The proprietor jumpe from the window of his bedroom on the ground floor to sound an alarm fro the near-by street box. A telephone alarm sent in by one of the guests wa received at fire headquarters at the same time. The fire department responde promptly and did good work in preventing an even greater loss of life. Mo of those rescued were taken from windows and from the second story roofs a which the two fire escapes terminated. Practically all those who perished wer trapped in their rooms or fell in corridors before reaching exits, which wer soon cut off by the flames.

The floors above the basement were almost entirely involved in a ver short time. The roof caved in, followed by collapse of one side of the buildin at an early stage of the fire, and the efforts of both the local fire departmen and apparatus called in from neighboring towns could not prevent genera destruction of the building.

Conclusions.

This fire demonstrates need for proper construction, adequate exits, auto matic sprinkler protection and proper fire alarm facilities, particularly in hote buildings of a combustible nature.

Rear view of the Van Deusen Inn, showing the extent of the damage.

Occidental Hotel Fire, Muskegon, Mich.

Report by Michigan Inspection Bureau,
(Member N. F. P. A.)

A spectacular fire originating in the basement of the old brick-joisted section of the Occidental Hotel in Muskegon, Mich., early on the morning of March 4, 1936, destroyed the building, seriously damaged the fire-resistive annex and endangered the lives of the hotel guests. Inferior construction and unprotected vertical and horizontal openings were largely responsible for the rapid spread of the fire, which caused approximately $250,000 damage.

Construction and Occupancy.

The hotel property consisted of an old front section composed of three and four-story brick-joisted buildings, with an eight-story annex of fire-resistive construction located in the rear, and facing a side street. The floors of the fire-resistive section were of concrete and tile and most of the partitions were of 3-in. gypsum blocks. There were communicating openings between the various sections of the hotel. Vertical openings included stairways, a pipe shaft and an unused elevator shaft. This former elevator shaft, located near the point where the fire started, was the principal channel for the rapid upward spread of the fire. It was of frame construction covered by metal lath and plaster with openings boarded up and covered with plaster board. Two elevators were in service in the fire-resistive section.

At the time of the fire there were approximately two hundred and thirty persons in the hotel. Fortunately only twenty guests were in the old brick-joisted front section and only three rooms were occupied on the fourth floor of the fire-resistive section where the damage was severe.

Private Protection Available.

The entire building, with the exception of stores on the first floor, was equipped with a central station combined watch and fire alarm service. The building was also equipped with standpipes with hose on each floor and had a sub-standard system of automatic sprinklers in the halls of the front brick-joisted section. The sprinklers were connected to the 2 and 2½-in. standpipes supplied by two electrically driven domestic pumps located in the basement. This sprinkler installation was of no value due to the inadequate supply and sub-standard system and the fact that the fire originated in an unsprinklered area.

Story of the Fire.

On the morning of the fire the watchman completed his last round and reported at the master box in the basement in the vicinity of the origin of the

Firemen playing heavy streams on the blazing brick-joisted front section of the Occidental Hotel at Muskegon, Mich., on the morning of March 4, 1936. Unprotected vertical openings contributed to the rapid destruction of this section of the building. A newer fire-resistive section in the rear was also damaged.

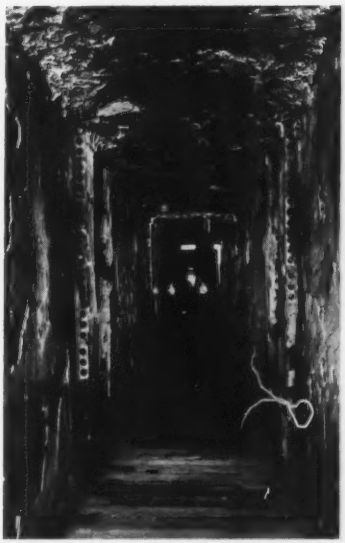
fire at 5:55 A.M. A bell boy left a suit of clothes in the basement pressin room at approximately 6:15 A.M. The cause of the fire has not been definitel determined, but the fire apparently originated in this room in the old brick joisted section of the hotel. About fifteen minutes later the clerk at the des on the first floor noticed smoke issuing from the basement stairs and sent i an alarm by telephone to the fire department at 6:31 A.M.

As soon as the clerk had sent in the alarm he rang the telephones in a occupied rooms in the brick-joisted section and sent bell boys into that sectio to arouse guests, but due to smoke and flames they could not get to any of th rooms. The clerk did not wait for an answer on the telephone, but simpl rang the rooms. Of the twenty guests in the old section about half were take from the building over fire department ladders. The others escaped throug a hall and fire escape at the rear of this section, as none of them were rooms near the origin of the fire. The guests in the fire-resistive section ha no difficulty in getting out as there were none in the part of the fourth floo which was damaged. Seven bell boys went through the fire-resistive sectio with pass keys and opened all doors, searching each room and closet.

Three engines and a service ladder truck with a total of seventeen fir men responded to the first alarm. A hose line was laid and the stream wa directed into a basement window from which flames were issuing. Very short afterward there were calls for help from guests in the front section and a fire department operation was centered on saving lives. Two additional alarm

were sounded, bringing three more engines. At 7:15 A.M. Muskegon Heights sent an engine, and an engine from Grand Haven filled in at headquarters. At the time the first alarm was received the Muskegon fire department was changing platoons, so that by 7:15 A.M. approximately seventy-five firemen from both shifts were at the fire.

A thin wooden partition separated the pressing room from the old unused elevator shaft. Seemingly, the fire quickly spread into the shaft and going to the top mushroomed on the fourth floor and was driven down the fourth floor corridor of the fire-resistive section by the wind. The contents of a number of rooms along this hall as well as all the doors and trim in the corridor were completely consumed. There was considerable damage on the floors above, caused by fire communicating through a pipe shaft. Other floors in this section were damaged by smoke and water. The brick-joisted front section was completely destroyed.



View along the corridor on the fourth floor of the fire-resistive section of the hotel, showing how the fire burned off the doors and trim, and destroyed the tile and gypsum construction.

All extinguishing work was done by fire department hose streams. The standpipes were not used. Electric current for the fire pumps supplying the standpipes and sprinklers was out of service at 6:30 A.M., as the electric clocks stopped at that time. Records of the central station alarm service showed that their boxes were in service until 7:15 A.M., but were not used, as the alarm was given by telephone.

Insurance carried on the building and contents, including tenants on the first floor, amounted to $1,148,000. It is estimated that the total loss approximated $250,000.

Cold Metal Process Co. Fire, Youngstown.

Report by Ohio Inspection Bureau,
(Member N.F.P.A.)

The plant of the Cold Metal Process Company, Youngstown, Ohio, was destroyed by fire on March 4, 1936, with a total loss estimated at approximately $414,000 exclusive of losses incident to the interruption of business. The building involved was a structure 450 ft. long and from 75 to 125 ft. wide. The construction was largely of unprotected steel, with a wooden roof. Combustible fibre board was largely employed for interior partitions and for insulating purposes. There were no fire walls or other interior fire-divisions except a minor concrete enclosure housing transformers. There were no automatic sprinklers or automatic fire alarm protection.

Construction and Occupancy.

The main building was a high one-story structure without basement. It had a skeleton steel frame, steel and glass walls, with tile apron walls 8 ft. to 10 ft. high, and a composition covered wood sheathed roof on steel trusses and columns. The floor was concrete and earth except in comparatively small office and laboratory sections where the floor was ordinary wood joisted. The ceiling was open finish, but most of the steel sections of the exterior wall were ceiled with combustible fibre board. It was necessary to maintain an even temperature inside the plant due to the precision work. There were several good sized partitions of fibre board on wood studding extending from the floor to the roof. A comparatively small office building is two stories with basement and is of ordinary frame construction with slate roof. Buildings were in good repair.

The business consisted of the cold rolling of shim steel and the manufacture of cold rolling mill machinery. The rolling mill machinery has a high value in the finished and semi-finished state. The hazards consisted of machine shop work, cold rolling of shim steel and a small amount of wood working. Electric and oxy-acetylene welding was done in a combustible enclosure. The rolls of the cold rolling mills were lubricated by gravity from a 750-gallon elevated oil tank which was fed by pump from an open 1200-gallon tank located under the floor. About 7 barrels of oil were stored at various locations about the plant.

A standard equipment of hand chemical extinguishers had been recently installed, but there were no standpipes. The public protection was good except at the rear of the plant, which was along the river bank, and inaccessible. The water supply was adequate, with 8-in. circulating mains in adjoining streets.

Charles N. Demian.

Ruins of one end of the Cold Metal Process Co. building, Youngstown, Ohio, destroyed by fire on March 4, 1936, with a loss of over $400,000. This building, largely of unprotected steel and wood construction, with a large amount of combustible fibre board, was 450 x 125 ft. in size. There were no fire walls, no automatic sprinklers, no automatic fire alarm, and no standpipe and hose system.

Story of the Fire.

The cause of the fire has not been definitely determined, but the most probable cause seems to be the ignition of a combustible partition by sparks from an oxy-acetylene torch which was being used in rearranging a crane track. The fire apparently gained considerable headway in the partition before it was discovered. The men who were working on the crane track had difficulty in escaping without injury. When the fire was discovered the workmen fought it with the hand extinguishers. Workmen told the fire chief that they were fighting the fire on one side of the partition and were unaware that it was raging on the other side and spreading upward to the roof. The fire had gained enough headway to be visible from the outside before an alarm was sent to the fire department, as the fire department states that a passenger on a passing street car turned in the first alarm from a street box. Almost simultaneously alarms were received by telephone and through the two central station boxes inside the plant. The first alarm was received at the fire department at 1:31 P.M. Two pumpers, a chemical truck and a ladder truck answered the first alarm. When they arrived and started laying hose it was seen that the fire was beyond control and a general alarm was turned in which was received at 1:36. This brought all available apparatus in the city with about 75 men. In addition some of the firemen off duty were called.

The fire originated in a partition near the center of the building and spread rapidly under the wooden roof in both directions. In less than one-

half hour the fire had spread over the entire wooden roof and the heat was so intense that the entire structure collapsed, dropping the burning wooden roof to the floor. The fire department concentrated their efforts on saving a frame office building fifty feet from the main building, where valuable drawings and blue prints were located, and a two-story frame mercantile building adjacent to the office. Their efforts were successful, though some damage was done to these buildings. The firemen were hampered by the intense heat and dense black smoke from the burning roof; their efforts seemed futile in combating a fire in such a large burning area. The river made the plant inaccessible from the rear, but the fire chief does not believe that the inaccessibility from that side affected the final result to any great extent, as the fire was beyond control when the department arrived. About 20,000 ft. of hose was used on 17 to 20 lines. Some hose was lost in the fire. All available hydrants on the 8-in. circulating mains were used, supplying ample water.

Loss.

The loss is estimated at $414,000, exclusive of use and occupancy. The entire contents, which were largely incombustible, were involved in the fire. Although at first thought the nature of the contents would cause one to believe that they were not ordinarily susceptible to damage by fire, it was stated, nevertheless, that the salvage, if any, will be very small. The rolling mills were of the type used for cold rolling and these are somewhat smaller than the ordinary rolling mill equipment found in hot process mills. Steel was rolled down to 1/1000 of an inch thick and required considerable precision work. Consequently the bearings, adjustments, oil systems, etc., were rather delicate. The transformers in the fire-resistive transformer room are said not to be damaged very much. A small amount of damage was done to the office building and the frame mercantile building adjacent to it. Slight damage was done to other properties near by. Several automobiles parked near the plant were destroyed. It is reported that a considerable value in workmen's tools was also destroyed.

Conclusions.

One-story buildings with undivided wooden roofs present total loss possibilities regardless of construction of the walls or the nature of the contents. Fires in large undivided wooden roof area are very difficult to control, especially when they have gained much headway. Large wooden roofs should be separated by standard fire walls so that damage can be confined to a smaller area.

Automatic sprinklers would probably have extinguished, or at least controlled the fire until the fire department arrived and also given an early alarm.

An automatic fire alarm system would have given an early alarm, thus eliminating the human element in discovering the fire and any delay in trans-

mitting the alarm. Earlier notification to the fire department would probably have prevented the fire gaining such headway.

An approved standpipe and hose system might have been of assistance in extinguishing or controlling this fire.

A standard vault should be provided for valuable papers, drawings and blue prints. This firm was contemplating such a vault.

Interior combustible partitions and wall insulation provide a path for fire to be transmitted from the floor to the combustible roof. Partitions and wall insulation should be of non-combustible material.

Hydrogen Plant Explosion, Chicago.

An explosion in the hydrogen building of the vegetable oil hardening plant of Swift and Company in the stockyard district of Chicago, Ill., on the afternoon of February 13, 1936, caused the death of four workmen, serious injuries to several others, as well as the destruction of several plant buildings. Other buildings within a three hundred foot radius suffered broken windows and other damage. The explosion was the result of the ignition of hydrogen gas which escaped from a leaking pipe. The source of the ignition was not determined.

Description of Plant and Processes.

The hydrogen building in which the explosion occurred was known as Building No. 105, and was one of three principal buildings of the vegetable oil hardening plant. Hydrogen was manufactured for use in the hydrogenation processing of vegetable oils. This building and adjoining Building No. 30 were of three and four-story, non-combustible construction, with brick walls and with floors and roofs of concrete on iron columns. A third building of brick-joisted construction was not involved in the explosion. Hand operated iron doors were provided between the various communicating sections of the plant.

The plant had been in operation about twenty-five years. Prior to about three years ago, hydrogen was made by the electrolytic process, but at the time of the explosion the Schultz process was being used. In this method steam is broken down by passing it over heated iron turnings in closed vessels. The hydrogen was compressed by compressors located on the first floor and stored in tanks on the roof. There were two gas driven compressors and one steam operated compressor.

Story of the Explosion.

The explosion occurred on February 13, 1936, at 1:15 P.M., and resulted in the death of four men. Three of the workmen were killed somewhere in

Wreckage of the hydrogen plant of Swift and Company in Chicago. Firemen are shown searching the ruins in an effort to locate the victims.

Building No. 105, and the fourth man was killed outside of the building by a falling wall. Two operators who were on the roof closing valves were injured, but not fatally. Normally only two operators are employed in this building, but repairs were being made to the compressors by other workmen.

Employees testified at the inquest that a hissing noise had called attention to a leak in piping between the compressors and the tanks at the roof several minutes prior to the explosion. The operators first shut down the compressor equipment and were on the roof shutting valves to the tanks when the blast occurred. Only the steam compressor was operating at the time.

Ignition of hydrogen gas, which has an explosive range of from 4.1 to 75 per cent, might have been due to a static spark due to the rush of gas out of the leak, to contact with the open flame of a gas fired catylist dryer upstairs, or to any one of various other causes.

Extent of Damage.

As no insurance was carried, a reliable estimate of the loss was not available. Building No. 105 was demolished except for a cut-off end housing gas generators. A large section of Building No. 30 was also wrecked.

NOTE: This account has been prepared from data furnished by Joseph G. Hubbell (Member N.F.P.A.) and by J. I. Banash (Member N.F.P.A.).

Cuyahoga River Fire, Cleveland.

Report by Ohio Inspection Bureau,
(Member N.F.P.A.).

The industrial area along the Cuyahoga River in Cleveland, Ohio, was seriously endangered on the morning of February 7, 1936, by a fire which spread over oil and scum on the surface of the river. The fire started near a railroad bridge where the water was shallow, and was pocketed by the stone abutment of the bridge. Fortunately the fire was confined to that section and adjoining property was saved.

Description of Area Involved.

The Cuyahoga River has long been recognized as a potential fire hazard. Due to the slow current, oil and chemicals accumulate on the surface of the water. Boats passing up and down the river and the unloading of gasoline, oils and chemicals from tankers are the principal sources of these materials. The river is sluggish all the year and there is practically no current in winter when the tributaries are frozen. There are also small bays and indentures where oils accumulate. At the time of the fire the river was one and a half feet below normal due to frozen tributaries. The river itself was kept from freezing by chemicals in the water.

In addition to the railroad bridge exposed property included an oil distributing plant across the river from the fire having in storage ten million gallons of gasoline. Farther up the river were various other oil distributing stations with over fifty million gallons of gasoline stored. These plants would have been endangered if there had been a strong wind or current to carry the fire.

Story of the Fire.

A steam freighter six hundred feet long tied up at the bank of the river was being dismantled. A workman was using an acetylene torch in cutting away steel plate from the stern of the vessel and sparks fell into the igniting oil on the surface. Since there was no current or wind the water did not carry the burning oil, but the fire spread rapidly over the oil before the fire department arrived.

Fire department response consisted of eleven engines, two trucks, one rescue squad and one foam generator. No fire boats were available as due to economies the boats have been removed from service for some time and are beyond repair. After the fire department started working the spread of the fire was arrested by a surrounding curtain of water from ten hose streams on three sides. After the fire had been confined it was smothered by the use of foam, one half ton of which was required to subdue the fire. Due to a badly curtailed

Burning oil and residues on the Cuyahoga River in Cleveland, Ohio, on February 7. Flames in the center of the picture damaged the stone abutments of a railroad bridge.

budget the fire department had only one ton of foam chemicals. However, recognizing the hazard involved by a severe fire on the river, arrangements had been made with various plants along the river to secure their foam, totaling about nine tons, if necessary. These plants were promptly notified and loaded their foam on trucks ready to respond if needed.

Extent of Fire and Damage.

Fortunately there were no boats docked in the section of the river where the fire occurred. The fire carried about one half way across the river and reached a point one hundred feet from exposed gasoline tanks. The stone abutment of the railroad bridge was badly spalled, with damage estimated at $8000. No firemen were injured, but the workman using the acetylene torch was burned or injured when he jumped or fell into the water.

This is the second serious river fire. The first fire occurred about fifteen years ago and occurred directly across the river from the location of the recent fire. On that occasion a gasoline tanker was leaking and in the course of making repairs a fire was started. The gasoline burned rapidly and spread rapidly along the oil floating on the water. Seven men were burned to death during the first fire. Such fires illustrate the need for modern fire boats with foam equipment.

Gas Explosions, Utica, N. Y.

All business in the "Busy Corner" section of downtown Utica, N. Y., was entirely suspended for over forty-eight hours, telephone and gas service over a large area was interrupted, and several fires occurred in near-by buildings, following the ignition of gas escaping from a street main on February 17, 1936. The break in the gas main was the result of a broken water main. The gas was ignited by a workman's pick striking a stone or metal while workmen were attempting to repair the leaking water main. A gale was blowing almost continually from the time of the water break until the afternoon of February 19th. The temperature ranged from zero to ten below zero.

A leak, presumably due to electrolysis, was discovered in a water main at a point under or near street car tracks at about 6 P.M. on February 17. Workmen were summoned, and digging was started to make repairs. When the section of pipe was uncovered it was found to have been eaten away for approximately three feet and the remaining metal was very soft. This leak had apparently existed for some time, as the water had washed out a cavity which extended for fifteen to twenty feet square, and to a depth of from five to seven feet. Exit from this cavity was through a hole in the pavement about four feet square and through a subway and a sewer manhole where the water had washed away bricks. The water also undermined low pressure gas mains which passed above the water main. Both the gas and water mains were of six-inch diameter. It is believed that as a result of the washing away of the soil supporting the gas main sufficient strain resulted to break the pipe.

Escaping gas was not noticed for several hours and it is stated that smoking was permitted where the men were digging until during the night a spark from a workman's pick ignited the gas in the cavity caused by the washout. The burning gas was not shut off as there was no way to shut off this section without cutting off essential gas services supplied by interconnected mains over a considerable area. So strong was the gale that it apparently confined the flaming gas and drove excess gas into the sewers and electric conduits.

At 10 A.M., on February 18th, the fire backed through the sewers and subways and blew off four manhole covers in an area of three blocks. Fire and explosion also followed the electrical entrances from the conduits into several buildings in the vicinity. The explosions entered the cellars of three buildings and damaged windows of several others. Fortunately the fires were extinguished before serious damage was done, but a fireman and policeman were severely injured when struck by a flying manhole cover. More than five thousand telephone lines in underground conduits in the affected area, including police department lines, were put out of service.

Workmen excavated to make repairs after the fire was extinguished. The break in the gas main may be seen in the center of the picture; the water main was located below the gas main.

Methods of Control.

The fire and police departments were on duty throughout the night while the gas was burning. On the discovery early on the morning of the 18th that gas was leaking, all buildings were inspected and occupants for a distance of two to five blocks from the involved corner were aroused. Occupants of buildings in the area were warned to be on the alert for gas and to maintain proper ventilation. Furnace fires were extinguished where adequate ventilation could not be maintained. Buildings in the immediate danger zone were vacated.

Fire apparatus was stationed in the vicinity from 11 P.M., February 17, to 3 P.M., February 19. Men and apparatus were changed frequently because of the severe weather conditions. In the afternoon of February 18, off duty police and firemen were recalled and a few National Guard men were on duty.

Only a few hydrants were cut off by the shutdown of the broken water main and adequate water supplies were available at all times. Gas service was maintained by piping gas from another direction to the area supplied by the broken main. Warnings were broadcast by radio to householders to report to the gas company any difficulty with the gas supply. A few buildings in the "Busy Corner" section where the trouble occurred were without gas service. The value of a municipal fire alarm service was illustrated as fire department officials were able to use the telegraph keys in the fire alarm boxes to maintain communications, although a large section of the city was without telephone service.

The shutting off of the broken gas main was finally achieved by sawing off and capping the main, after "bagging" the mains by drilling holes and inflating balloons inside. The danger of fire flashing back through the mains while they were being sawed and capped was a matter of considerable study, as was the method of finally extinguishing the underground blaze. Carbon dioxide gas was used in one section to drive the gas from the location being capped toward the place where the gas was ablaze. After all the known gas mains were sawed off and capped the fire was extinguished underground with two hose streams, after which digging was begun and the real source of the leak was discovered in an uncharted pipe.

Odd Fellows Building Fire, Columbus.

Five firemen were killed, several others were seriously injured and a loss of more than $115,000 resulted when fire destroyed the Odd Fellows Temple in Columbus, Ohio, early on the morning of February 19, 1936. The fatalities were due to the collapse of the entire rear of the structure about two hours after the fire started. The collapse was attributed to weakness of the heavy brick walls, due to the age of the structure.

Construction and Occupancy.

The building, three to five stories in height, was located in the center of the business district. The original building was constructed in 1849. An addition was constructed in 1864, and an upper floor was added in 1890. The building was of brick-joisted construction with sixteen-inch exterior walls, and brick interior walls. The front of the building was faced with stone. The roof was composition on wood sheathing and a frame cupola extended twenty feet above the center of the roof. Heating was by a new gas fired steam plant and individual poorly arranged gas and coal stoves. The electric wiring in the building had numerous defects, but was not a factor in the fire.

The basement contained a heating plant for the lodge rooms, a barber shop and storage rooms for the various tenant stores on the first floor. The upper floors contained various lodge rooms.

Story of the Fire.

The fire started in the basement, probably from a new gas furnace installed six weeks before. It was discovered by the proprietor of the barber shop in the basement, who turned in an alarm at 12:43 A.M. Four additional alarms were sounded by firemen, bringing thirteen engine companies, five truck companies and the salvage and rescue company, with a total of 110 firemen. In addition to two aerial ladder pipes approximately fifteen other streams were in operation. The firemen worked in temperatures ranging from three to six degrees below zero.

The fire spread rapidly through the building and it is reported that before the first apparatus arrived flames were coming out the frame cupola on the roof. About two hours after the start of the fire five members of the department, including two captains, a lieutenant and two firemen, were directing a stream into the building from an iron fire escape on the rear wall, when without warning the entire rear of the building collapsed. All of the men were buried under the mass of débris and died before being removed or shortly after-

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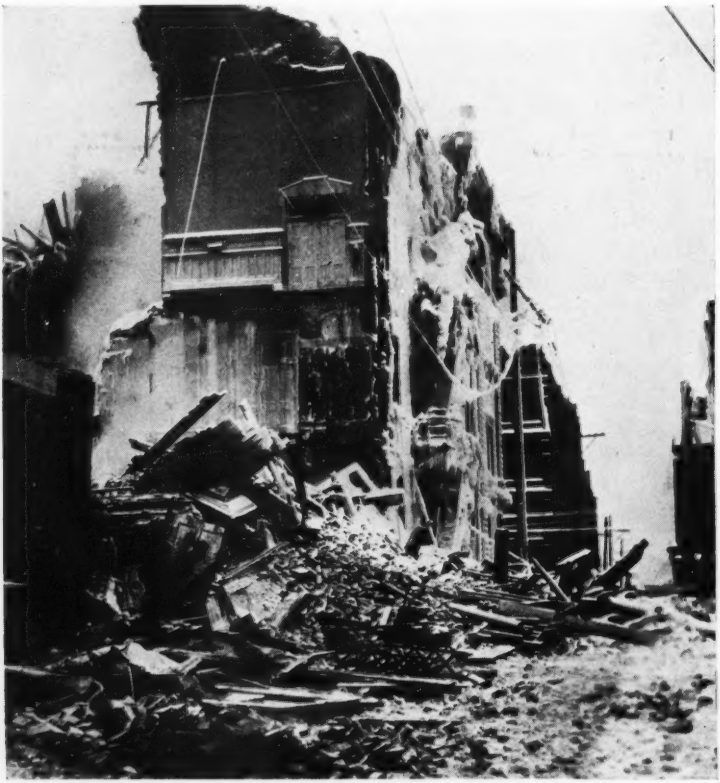
This article has been prepared from a report of the Ohio Inspection Bureau (Member N.F.P.A.) and other local sources.

ward. A number of other firemen were injured by the collapse. Although the walls were of sixteen-inch brick construction, the mortar had badly disintegrated with age and its strength was not sufficient to withstand the shock of falling floors and roof. A building across a fifteen-foot passageway in the rear was also badly damaged by the falling walls.

Loss.

The building was a total loss. Walls which remained standing had to be demolished. The total loss was in excess of $115,000, including $5000 damage to the walls and roof of an adjoining building and $4000 damage to the building across the alley in the rear.



Acme.

The collapse of walls weakened with age and unable to withstand the shock of falling floors and roof resulted in the death of five firemen who were working on a fire escape in the rear of the Odd Fellows Temple in Columbus, Ohio, on February 19, 1936.

Fires in Which There Was Loss of Life.

First Quarter, 1936.

Since the publication of the January QUARTERLY, the N.F.P.A. Department of Fire Record has received from various sources 293 reports of fires in which there has been loss of life. A total of 558 lives were lost in these fires. During this period the following fires were reported in the United States and Canada which caused the loss of more than five lives each.

DECEMBER 30, 1935, PLATTEVILLE, WIS. A father, mother, and five children were fatally burned in their farm home by a fire started when corncobs soaked in kerosene were used to start a fire in the kitchen stove.

JANUARY 5, 1936, WESTFIELD, MASS. Seven persons lost their lives when trapped by a night fire which swept an inn. (See report on page 352.)

JANUARY 12, 1936, DELRAY, W. VA. A family of seven was fatally injured by an explosion of an acetylene generator in the basement of their rural home.

JANUARY 20, 1936, LOUISVILLE, COLO. Eight miners lost their lives in an explosion in a burning coal mine. The men were building a fire wall, to check a fire which had been burning for a long time, when they were trapped by the blast.

JANUARY 31, 1936, SCOTTSBORO, ALA. Twenty negro convicts were burned to death behind the locked doors of a motorized prisoners' van. The prisoners' cage also contained a drum and a small can of gasoline, some of which had been spilled. The gasoline ignited when a prisoner lighted a piece of paper to warm his hands. The driver stopped the truck and unlocked the door, but could save only two of the convicts.

FEBRUARY 3, 1936, PARKER DAM, CALIF. Seven men were burned to death in an early morning fire which destroyed a two-story frame workers' dormitory. Six of the victims were workmen employed in the construction of Parker Dam, and one was a traveling salesman allowed to sleep in the dormitory.

FEBRUARY 12, 1936, LAKEWOOD, N. J. Sixteen persons lost their lives and others were injured in an early morning fire which destroyed a three-story frame resort hotel. (See report, page 348.)

FEBRUARY 12, 1936, NEW YORK, N. Y. Nine lives were lost in a panic which occurred in a second floor restaurant, when fire broke out in a store on the floor below. (See report, page 318.)

FEBRUARY 18, 1936, SOUTH HUTCHINSON, KANS. A family of seven lost their lives from fire and suffocation believed to have been caused by an overheated coal stove in a crowded bedroom. The house was tightly closed, due

to the cold weather. Most of the family was suffocated in their beds, although several bodies were found near doors and windows through which they had tried to escape the flames.

MARCH 1, 1936, RUSHVILLE, N. Y. A mother and six children were trapped and burned to death in a midnight fire of unknown origin which swept a farmhouse. The children's father and grandparents were forced to jump from the second-story windows and were severely injured.

Foreign Fires.

During the period covered by this report two outstanding loss of life fires occurred outside of the United States and Canada, as follows:

TIENTSIN, CHINA, FEBRUARY 14, 1936. According to press reports a fire occurred in the slums, taking one hundred and fifty lives and making thirteen hundred persons homeless.

VALPARAISO, CHILE, FEBRUARY 17, 1936. Fire originating in a motion picture film exchange on the first floor quickly enveloped the building, which contained crowded tenements on the two floors above. Several explosions accompanied the fire. Few of the occupants escaped. The toll was thirty-four dead and missing.

Loss of Life Fires, January-March, 1936.*

This is a typical rather than a complete record, presented to show the conditions under which loss of life occurs, that they may be known and guarded against. The total loss of life by fire in the United States is estimated at 10,000 annually.

	No. Fires	Men	Women	Children	Total
Fires in Buildings:					
Apartments, hotels, lodgings, tenements, etc...	36	39	31	13	83
Bunk houses	2	11	0	0	11
Churches	1	1	0	0	1
Dwellings—Rural	80	28	39	110	174
Dwellings—Urban	119	42	57	65	164
Gas works	1	1	0	0	1
Institutions, schools, etc.	5	4	4	2	10
Manufacturing occupancies	8	8	4	0	12
Mercantile occupancies	1	1	0	0	1
Other known buildings	8	16	0	0	16
Restaurants	1	6	3	0	9
Fires Outside of Buildings:					
Airplanes	2	8	0	0	8
Automobiles	7	30	1	1	32
Mining property	3	10	0	0	10
Oil refineries	1	1	0	0	1
Out-of-door fires (bonfires, etc.)	10	6	1	4	11
Ships and boats	2	4	0	0	4
Tankers and barges	3	7	0	0	7
Response to alarms	1	1	0	0	1
No data	2	2	0	0	2
Total	293	226	140	292	558

*This table is made up from those reports received by the Department of Fire Record between December 18, 1935, and March 14, 1936. A few of the fires included herein occurred prior to December 18, but were not reported until subsequent to that date.

Causes of Loss of Life, January-March, 1936.

Cause	Men	Women	Children	Total
Airplane fires	8	0	0	8
Automobile and truck fires	10	1	1	12
Trapped in prisoners' van	20	0	0	20
Boat and ship fires:				
Motorboat explosions and fires	4	0	0	4
Ship fires (see also flammable liquids, gasoline tank vessels)	3	0	0	3
Children alone in house	0	0	13	13
Children playing with matches	0	0	4	4
Clothing ignited:				
Bonfire, grass or rubbish fire	3	1	4	8
Electric plate ignited crib	0	0	2	2
Fireplace or open grate	2	3	3	8
Furnaces, stoves and heaters	4	19	13	36
Smoking (see also smoking in bed)	4	0	0	4
Sparks from soap factory vat	0	1	0	1
Stepped on match	0	1	0	1
Toy electric stove	0	0	1	1
No data—clothing ignited	0	2	1	3
Entering or re-entering burning buildings	3	2	0	5
Escaping from fire—jumped or fell	5	5	1	11
Explosions (miscellaneous):				
Carbide lighting plant	1	1	5	7
City gas (including appliances)	9	5	1	15
Gas plant struck by automobile	1	0	0	1
Hydrogen plant	2	0	0	2
Sewer gas explosion	5	0	0	5
No data	2	3	0	5
Fire fighting—firemen	10	0	0	10
Flammable liquids and vapors:				
Children threw match into gasoline tank	0	0	2	2
Gasoline ignited by kitchen stove	1	2	6	9
Gasoline pipe line explosion	1	1	0	2
Gasoline stove filled while lighted	0	0	1	1
Gasoline tank vessels and barges	3	0	0	3
Gasoline torch exploded	2	0	0	2
Heating gasoline on or beside stove	0	1	1	2
Heating motor oil on stove	0	0	2	2
Home dry cleaning	2	6	1	9
Cleaning with gasoline in electric washer	0	1	0	1
Other cleaning with gasoline	2	0	0	2
Oil furnace explosions	1	2	5	8
Oil stove or lamp	7	2	2	11
Oil refinery explosion	1	0	0	1
Polishing stove with flammable liquid	0	3	1	4
Starting fires with gasoline	1	0	2	3
Starting fires with kerosene or motor oils	6	15	26	47
Varnish remover ignited by sanding machine	1	0	0	1
Mine fires and explosions	10	0	0	10
Overcome by smoke—suffocation	7	4	15	26
Overexertion, shock or excitement	1	0	0	1
Response to alarms	1	0	0	1
Panic resulting from fire	4	2	0	6
Smoking in bed (see also clothing ignited)	6	3	0	9
Trapped in burning buildings	69	50	70	189
Trapped by Christmas tree fires	1	2	7	10
Trapped in incendiary fires	3	1	2	6
No data	0	1	0	1
Total	226	140	192	558

Typical Loss of Life Fires.

Gas Explosions.

L-3372. RIVER ROUGE, MICH., FEBRUARY 16, 1936. Two men and two women were killed by a gas explosion which wrecked two homes. Extremely cold weather may have been responsible for a leak in a gas main, causing gas to enter the building.

L-3369. MALDEN, MASS., MARCH 6, 1936. A wealthy produce broker was killed by a gas explosion which wrecked the kitchen of his home. It is believed that the victim, while lighting the stove, allowed too much gas to escape before applying a match.

Flammable Liquids Ignited.

L-3379. OMAHA, NEB., JANUARY 5, 1936. A seven-year-old girl was drenched with flaming gasoline and burned to death when she placed a three-gallon can of the liquid on the kitchen stove, causing an explosion. Two roomers in the house smothered the flames on the child's clothing with blankets, but not before almost her entire body was badly burned.

L-3378. STANLEY, MAN., JANUARY 6, 1936. A father, mother and daughter were fatally burned and three other children were seriously burned when a can of gasoline which was brought into the kitchen exploded and threw flames over the entire family when fumes ignited from the stove.

L-3376. PLEASANT VALLEY, IOWA, JANUARY 26, 1936. Two children were burned to death and three other persons were severely burned in a fire which resulted from an explosion of a can of motor oil placed on the stove.

L-3381. LONDON, ONT., FEBRUARY 7, 1936. Four children were burned to death and their father was seriously burned, when a jar of gasoline brought in from the extreme cold outside cracked in the warm kitchen. The father was attempting to mop up the liquid from the floor when gasoline vapor was ignited by the fire in the kitchen stove.

L-3371, RACINE, WIS., FEBRUARY 17, 1936. In spite of his wife's warning, a farmer, who had been having difficulty in starting his automobile, brought a can of gasoline into his house to warm near the kitchen stove. His wife was washing dishes in the kitchen when the gasoline exploded and enveloped her in flames. She ran outside and rolled in the snow, but was fatally burned before the flames were smothered.

Home Dry Cleaning.

L-3374. HUGOTON, KAN., FEBRUARY 14, 1936. One woman was burned to death and another was critically burned when gasoline with which they attempted to clean clothes in an electric washer exploded. The explosion threw flaming gasoline on the clothing of the women.

Polishing Stove with Flammable Polish.

L-3380. SUMMIT, N. J., JANUARY 1, 1936. A woman was fatally burned while polishing the top of a kitchen stove with a flammable liquid polish. The polish ignited and set fire to her clothing. The victim ran upstairs, where her family put out the fire with blankets.

Starting Fires with Gasoline or Oil.

L-3382. ROUYN, P. Q., JANUARY 1, 1936. A man died of burns received in an explosion which occurred when he threw gasoline on the kitchen stove in the belief that he was using kerosene. He died nine days after the accident.

L-3373. CARTER, MONT., FEBRUARY 15, 1936. Four small children were burned to death and their mother and two other children were critically burned when the oldest son tried to start a fire with fuel oil as the family gathered about the stove during the extremely cold weather. The father was at work when the explosion occurred.

L-3370. FAIR PORT, VA., FEBRUARY 23, 1936. Two children were killed and their mother and an older child were badly burned when a twelve-year-old boy, one of the victims, poured benzine into the stove. The benzine is said to have been mistaken for kerosene.

Re-entering Burning Buildings.

L-3384. ADOLPHUSTOWN, ONT., DECEMBER 29, 1935. A farmer was burned to death in an early morning fire in his home when he returned for more clothing. A neighbor discovered the fire in the kitchen in time to arouse the man and his wife. As his wife was ill, the victim returned to the house for warmer clothing and was unable to escape a second time.

L-3377. CHICAGO, ILL., JANUARY 19, 1936. Aroused by the barking of their dogs a family escaped from their burning home, but one son returned to save a picture of his father and was trapped. A brother who attempted to save the victim was injured.

Toy Stove Ignited Clothing.

L-3375. BERKELEY, CALIF., FEBRUARY 3, 1936. A four-year-old child was fatally burned when her dress caught fire as she was playing with a toy electric cooking stove at her home.

Annual Sprinkler Tables—1936.

The annual sprinkler tabulation is published this year for the fortieth consecutive year. The tables which follow show the actual fire experience with automatic sprinkler equipments in seventy-one thousand three hundred fires. This is not intended as a complete statistical report of fires in sprinklered properties; it includes only those fires reported to the N.F.P.A. Department of Fire Record in sufficient detail to give the data necessary for the tables. While the fires included in this tabulation are probably only about half of the total number of fires occurring in buildings under sprinkler protection, with a total of 71,300 fires in the record and current reports being received at an average rate of approximately three thousand annually, there can be no doubt that this summary as a whole is completely representative, except perhaps in some occupancies where only a small number of fires are reported.

The total number of sprinklered fire reports received during the past year was 2700. This total includes 559 fires in which the sprinklers were not a factor. This latter classification includes fires occurring in unsprinklered portions of buildings which did not extend to the sprinklered portions, or fires occurring in sprinklered portions which were discovered and extinguished by other means before there was sufficient heat to open sprinklers. The total number of fires since 1897 in sprinklered properties where sprinklers were not a factor is 13,492.

The classifications "extinguished fire" and "held fire in check" appearing in the several tables may both be considered as satisfactory performance. The distinction between these two classifications is necessarily more or less arbitrary, depending upon the judgment of the original inspector. The great majority of the fires in the "held in check" columns are instances where hose streams or other equipment were used to extinguish fire in spaces which water from the sprinklers did not reach because of minor obstructions to distribution or unsprinklered portions, but where sprinklers functioned satisfactorily in preventing the spread of fire.

When reviewing the detailed tabulation of unsatisfactory sprinkler performance it should be noted that these fires represent a small percentage of the total number included in the record and that they are compiled not with the thought of emphasizing the relatively few cases where sprinkler operation is unsatisfactory, but pointing the way toward better performance by indicating those factors which should receive attention.

The annual sprinkler tables are designed to show to what degree fires have been automatically controlled in buildings equipped with automatic sprinklers. The term "Unsatisfactory" does not necessarily imply mechanical failure of the sprinkler equipment. Neither does it indicate that there was a large loss in a sprinklered building. "Unsatisfactory" sprinkler control means that for various reasons the sprinkler equipment did not automatically extinguish the fire or hold it in check. Reasons for "Unsatisfactory" sprinkler control are shown in Section I, and in Table No. 5 of Section II, of the following tables. In many of the fires where automatic sprinkler control was "Unsatisfactory" the loss was small, due to prompt extinguishment by other fire fighting equipment.

In the present record, the tabulation under Section I, entitled "Summary of Unsatisfactory Sprinkler Fires" has been amplified to show the number of unsatisfactory fires which have originated in unsprinklered portions of buildings. These fires were formerly classed under the heading, "Generally defective equipment." "Unsprinklered portions" is now shown as a leading cause of unsatisfactory sprinkler operation. Another change in this table is the reclassification of fires formerly classed as "Miscellaneous," segregating all fires due to plugged heads and clogged piping.

The record of sprinkler efficiency has been gradually improving during the forty years during which these tables have been compiled. This improvement reflects better installations, improved maintenance, and the gradual elimination or replacement of old systems antedating the adoption of the present standards. The progressive improvement in the record is shown by the following tables, which compare the results of sprinkler operation by ten-year periods.

Effect of Sprinklers — Ten-year Periods.

	Extinguished		Held Fire in Check		Total Satisfactory		Unsatisfactory		
	No.	%	No.	%	No.	%	No.	%	Total
1897-1906.....	2969	67.1	1179	26.5	4148	93.6	278	6.4	4426
1907-1916.....	8341	63.6	4231	32.3	12572	95.9	535	4.1	13107
1917-1926.....	11957	69.4	4628	26.8	16585	96.2	648	3.8	17233
1927-1936.....	17201	74.7	5005	21.7	22206	96.4	836	3.6	23042
Forty-Year Total.....	40468	70.0	15043	26.0	55511	96.0	2297	4.0	57808

No. of Sprinkler Heads Operating — Ten-year Periods.

	Total Operating	1		5 or less		10 or less		25 or less	
		No.	%	No.	%	No.	%	No.	%
1897-1906....	4440	1382	31.1	2914	67.2	3464	78.8	3950	88.7
1907-1916....	12653	3932	31.1	9035	71.6	10619	83.9	11812	93.4
1917-1926....	17419	6153	35.3	12701	73.0	14551	83.6	15943	91.7
1927-1936....	22962	9638	41.9	17268	75.2	19602	85.5	21405	93.3
Forty-Year Total.....	57474	20105	35.0	41918	72.9	48242	83.9	53110	92.5

SECTION I.

Summary of Unsatisfactory Sprinkler Fires.

	1935-1936 No. of Fires	1935-1936 Per Cent	1897-1936 No. of Fires	1897-1936 Per Cent
Water shut off	27	44.3	751	32.7
Generally defective equipment	5	8.2	208	9.1
Unsprinklered portions	3	4.9	195	8.5
Defective water supply or supplies	5	8.2	202	8.8
Sprinkler system crippled due to freezing	2	3.3	70	3.0
Slow operation of dry system or defective valve	1	1.6	72	3.1
Slow or defective operation of high test heads	..	..	27	1.2
Faulty building construction, concealed spaces, vertical openings, etc.	3	4.9	114	5.0
Obstruction to distribution	4	6.6	137	6.0
Hazard of occupancy too severe for average sprinkler equipment	3	4.9	130	5.6
Explosion crippled sprinkler system	2	3.3	111	4.8
Exposure or conflagration	..	..	89	3.9
Plugged heads and clogged piping	5	8.2	63	2.7
Miscellaneous	1	1.6	128	5.6
Total	61	100.0	2297	100.0

Fires in Which Failure Was Due to Water Shut Off Sprinklers.

Water shut off:	1935-1936 No. of Fires	1897-1936 No. of Fires
Unknown reason, neglect or carelessness	5	219
Before fire was out, or fire rekindled	5	137
Accidents or repairs	5	112
To prevent freezing	7	175
Probably incendiary	3	36
Leaky dry system	1	19
Defective gate valve	—	9
Miscellaneous	1	44
Total	27	751

SECTION II.

Annual Revision of Sprinkler Fire Tables.

The following tables are a summary of fires occurring in properties equipped with automatic sprinklers. The total number of such fires reported during the past year was 2700, which includes 559 fires where no sprinklers were opened. A number of reports were received in which the data were incomplete and these are not included in this tabulation.

Table No. 1 — Effect of Sprinklers.

	1935-1936 No. of Fires	%	1897-1936 No. of Fires	%
Practically or entirely extinguished....	1576	73.6	40468	70.0
Held fire in check.....	504	23.4	15043	26.0
Total Satisfactory.....	2080	97.0	55511	96.0
Unsatisfactory	61	3.0	2297	4.0
Total	2141		57808	

Table No. 2 — Number of Sprinklers Operating—Cumulative.

No. of Fires, 1897-1936.

No. of Sprinklers Operating	Wet	%	Dry	%	No Data	Total	%
1	17414	38.8	1963	20.2	728	20105	35.0
2 or less.....	25769	57.3	3341	34.8	1061	30171	52.3
3 or less.....	30214	67.3	4193	43.6	1253	35660	62.0
4 or less.....	33247	73.9	4893	50.9	1408	39548	68.8
5 or less.....	35068	78.1	5346	55.5	1504	41918	72.9
6 or less.....	36530	81.4	5763	60.0	1586	43879	76.3
7 or less.....	37553	83.6	6086	63.4	1632	45271	78.7
8 or less.....	38507	85.8	6358	66.1	1687	46552	81.0
9 or less.....	39138	87.1	6582	68.5	1723	47443	82.5
10 or less.....	39704	88.5	6769	70.5	1769	48242	83.9
11 or less.....	40134	89.4	6925	72.1	1790	48849	84.9
12 or less.....	40602	90.5	7124	74.1	1835	49561	86.2
13 or less.....	40874	91.3	7269	75.8	1854	49997	87.0
14 or less.....	41190	91.8	7410	77.1	1878	50478	87.6
15 or less.....	41448	92.1	7531	78.6	1897	50876	88.5
20 or less.....	42346	94.4	7936	82.5	1971	52253	91.0
25 or less.....	42870	95.4	8235	85.8	2005	53110	92.5
30 or less.....	43229	96.4	8434	87.8	2030	53693	93.6
35 or less.....	43449	96.8	8576	89.4	2051	54076	94.3
40 or less.....	43646	97.2	8692	90.5	2071	54409	94.8
50 or less.....	43889	97.6	8852	92.3	2101	54842	95.5
75 or less.....	44219	98.6	9065	94.5	2132	55416	96.4
100 or less.....	44370	98.8	9176	95.4	2143	55689	96.9
Over 100.....	452		382		47	881	
No data	116		103		654	873	
Open head systems	0		31		0	31	
Total.....	44938		9692		2844	57474	
Water shut off sprinklers.....						334	
Total.....						57808	

Table No. 3 — Number of Sprinklers Operating.

No. of Sprinklers Operating	No. of Fires, 1935-1936. Wet	%	Dry	%	No Data	Total	%
1	749	44.6	76	19.9	27	852	39.7
2	326	19.4	62	16.2	14	402	18.8
3	166	9.9	38	10.0	7	211	9.9
4	92	5.4	23	6.0	6	121	5.7
5	56	3.3	21	5.5	0	77	3.6
6	46	2.7	16	4.2	3	65	3.0
7	27	1.6	10	2.6	0	37	1.7
8	31	1.8	11	2.8	2	44	2.1
9	17	1.0	13	3.4	1	31	1.4
10	10	.6	8	2.1	1	19	.9
11	18	1.1	4	1.1	1	23	1.1
12	13	.8	5	1.3	1	19	.9
13	6	.4	3	.8	1	10	.5
14	8	.5	8	2.1	0	16	.7
15	12	.7	2	.5	1	15	.7
16-20	30	1.8	20	5.3	0	50	2.3
21-25	15	.9	12	3.1	1	28	1.3
26-30	13	.8	6	1.6	1	20	.9
31-35	5	.3	9	2.3	3	17	.8
36-40	8	.5	5	1.3	0	13	.6
41-50	11	.6	4	1.1	3	18	.9
51-75	4	.2	6	1.6	1	11	.5
76-100	5	.3	4	1.1	0	9	.4
Over 100	7	.4	9	2.3	2	18	.9
No data	4	.2	2	.5	4	10	.5
Open head system	0	..	5	1.3	0	5	.2
Total	1679	100.0	382	100.0	80	2141	100.0

No. of Sprinklers Operating	No. of Fires, 1897-1936. Wet	%	Dry	%	No Data	Total	%
1	17414	38.8	1963	20.2	728	20105	35.0
2	8355	18.6	1378	14.2	333	10066	17.4
3	4445	9.9	852	8.8	192	5489	9.6
4	3033	6.8	700	7.2	155	3888	6.8
5	1821	4.0	453	4.7	96	2370	4.1
6	1462	3.3	417	4.3	82	1961	3.4
7	1023	2.3	323	3.3	46	1392	2.4
8	954	2.1	272	2.8	55	1281	2.2
9	631	1.4	224	2.3	36	891	1.6
10	566	1.3	187	1.9	46	799	1.4
11	430	.9	156	1.6	21	607	1.1
12	468	1.0	199	2.1	45	712	1.2
13	272	.6	145	1.5	19	436	.8
14	316	.7	141	1.5	24	481	.8
15	258	.6	121	1.2	19	398	.7
16-20	898	2.0	405	4.2	74	1377	2.4
21-25	524	1.2	299	3.1	34	857	1.5
26-30	359	.8	199	2.1	25	583	1.0
31-35	220	.5	142	1.5	21	383	.7
36-40	197	.4	116	1.2	20	333	.6
41-50	243	.5	160	1.7	30	433	.8
51-75	330	.7	213	2.2	31	574	1.0
76-100	151	.3	111	1.1	11	273	.5
Over 100	452	1.0	382	3.9	47	881	1.5
No data	116	.3	103	1.1	654	873	1.5
Open head systems	0	..	31	.3	0	31	..
Total	44938	100.0	9692	100.0	2844	57474	100.0
Water shut off sprinklers						334	
Total						57808	

Table No. 4 — Effect of Sprinklers by Class of Occupancy.

	Extinguished Fire		Held Fire in Check		Total Satisfactory		Unsatisfactory		Total No. of Fires
	No.	%	No.	%	No.	%	No.	%	
Abrasive Works	30	73.3	9	21.9	39	95.2	2	4.8	41
Agricultural Implements	87	62.1	48	34.2	135	96.3	5	3.7	140
Airplane Factories	8	50.0	8	50.0	16	100.0	0	..	16
Airports and Hangars	3	42.9	4	57.1	7	100.0	0	..	7
Alcohol Distilleries	1	16.7	4	66.6	5	83.4	1	16.7	6
Aluminum Works	7	53.8	4	30.7	11	84.5	2	15.5	13
Amusement Places	34	81.2	4	9.5	38	90.7	4	9.3	42
Apartment Houses	172	86.0	28	14.0	200	100.0	0	..	200
Artificial Leather Mfg.	36	53.0	29	42.6	65	95.6	3	4.4	68
Asbestos Works	28	53.9	21	40.4	49	94.3	3	5.7	52
Automobile Mfg.	370	67.1	159	28.9	529	96.0	22	4.0	551
Automobile Body Mfg.	165	59.4	86	30.9	251	90.3	27	9.7	278
Automobile Paint Shops	12	66.7	6	33.3	18	100.0	0	..	18
Auto Sales and Service	44	68.8	14	21.9	58	90.7	6	9.3	64
Bag Factories	53	63.1	27	32.1	80	95.2	4	4.8	84
Bakeries	222	77.7	56	19.6	278	97.3	8	2.7	286
Basket Factories	15	83.4	2	11.1	17	94.5	1	5.5	18
Battery Mfg.	43	67.2	18	28.2	61	95.4	3	4.6	64
Bolt, Nut and Screw Works	27	60.0	15	33.3	42	93.3	3	6.7	45
Bottle Caps and Seals Mfg.	50	55.6	40	44.4	90	100.0	0	..	90
Bottling Works	11	78.7	2	14.3	13	93.0	1	7.0	14
Braid Mills	70	76.1	20	21.7	90	97.8	2	2.2	92
Brass and Copper Works	90	74.4	28	23.1	118	97.5	3	2.5	121
Breweries	5	62.5	3	37.5	8	100.0	0	..	8
Brick and Tile Works	1	100.0	0	..	1	100.0	0	..	1
Broom Factories	26	70.4	8	21.6	34	92.0	3	8.0	37
Brush Factories	36	69.4	15	28.9	51	98.3	1	1.7	52
Buildings Under Construction	5	55.4	3	33.3	8	88.7	1	11.3	9
Button Factories	81	83.5	14	14.4	95	97.9	2	2.1	97
Candle Factories	10	58.9	7	41.1	17	100.0	0	..	17
Candy Factories	270	72.8	89	24.0	359	96.8	12	3.2	371
Canneries	21	65.6	8	25.0	29	90.6	3	9.4	32
Canvas and Cotton Belting	8	66.7	4	33.3	12	100.0	0	..	12
Carbon Works	12	80.0	3	20.0	15	100.0	0	..	15
Car Houses	47	46.0	46	45.1	93	91.1	9	8.9	102
Car Works	83	61.0	48	35.3	131	96.3	5	3.7	136
Carpet and Rug Mills	231	65.4	109	30.9	340	97.3	13	2.7	353
Casket Mfg.	85	73.8	25	21.7	110	95.5	5	4.5	115
Cement and Plaster Mills	16	72.8	3	13.6	19	86.4	3	13.6	22
Cereal Mills	45	64.4	17	24.3	62	88.7	8	11.3	70
Chemical and White Lead Works	242	61.7	123	31.4	365	93.1	27	6.9	392
Churches	1	100.0	0	..	1	100.0	0	..	1
Clock and Watch Mfg.	20	80.0	5	20.0	25	100.0	0	..	25
Clothing Mfg.	2466	86.3	371	13.0	2837	99.3	23	.7	2860
Clubs—City	32	82.0	6	15.4	38	97.4	1	2.6	39
Clubs—Country	14	60.9	9	39.1	23	100.0	0	..	23
Coal and Wood Yards	3	27.2	7	63.7	10	89.9	1	10.1	11
Cocoanut Mills	6	75.0	2	25.0	8	100.0	0	..	8
Coffee and Spice Plants	108	72.0	38	25.3	146	97.3	4	2.7	150
Cold Storage Plants	18	69.2	8	30.8	26	100.0	0	..	26
Cooperage Plants	67	60.3	32	28.8	99	89.1	12	10.9	111
Cordage Works	270	64.1	126	30.6	396	94.7	16	5.3	412
Cork Plants	33	53.3	23	37.1	56	90.4	6	9.6	62
Cotton Gins	14	61.0	7	30.4	21	91.4	2	8.6	23
Cotton Mills	6736	66.1	3315	32.6	10051	98.7	118	1.2	10169
Cotton Seed Oil Mills	48	47.0	33	32.4	81	79.4	21	20.6	102
Cotton Warehouses	276	50.8	220	40.5	496	91.3	48	8.7	544
Cutlery Mfg.	30	60.0	17	34.0	47	94.0	3	6.0	50

	Extinguished Fire		Held Fire in Check		Total Satisfactory		Unsatisfactory		Total No. of Fires
	No.	%	No.	%	No.	%	No.	%	
Dairies and Creameries	10	77.0	3	23.0	13	100.0	0	..	13
Department Stores	852	79.9	189	17.7	1041	97.6	24	2.4	1065
Distilleries	14	60.9	5	21.7	19	82.6	4	17.4	23
Doll Factories	95	66.8	47	33.2	142	100.0	0	..	142
Drug Mfg. and Warehouses	282	79.7	65	18.3	347	98.0	7	2.0	354
Dry Cleaning Establishments	26	65.0	14	35.0	40	100.0	0	..	40
Dry Goods Stores	413	86.0	61	12.7	474	98.7	6	1.3	480
Dwellings	2	66.7	0	..	2	66.7	1	33.3	3
Dyeing, Bleaching, Finishing	346	60.9	204	35.9	550	96.8	19	3.2	569
Electrical Appliance Mfg.	604	73.9	201	24.5	805	96.4	13	3.6	818
Electric Power and Light	9	42.8	8	38.1	17	80.9	4	19.1	21
Excelsior Factories	37	68.6	13	24.1	50	92.7	4	7.3	54
Fertilizer Plants	33	66.0	13	26.0	46	92.0	4	8.0	50
Fibre Products	18	51.5	14	40.0	32	91.5	3	8.5	35
Fireworks Plants	1	16.7	3	50.0	4	66.7	2	33.3	6
Flax and Linen Mills	53	58.2	37	40.7	90	98.9	1	1.1	91
Flour and Grist Mills	103	54.9	53	28.2	156	83.1	32	16.9	188
Forge and Smithy	31	72.0	11	25.6	42	97.6	1	2.4	43
Foundries	269	61.2	151	34.3	420	95.5	20	4.5	440
Fruit Packing	11	100.0	0	—	11	100.0	0	—	11
Fur Works	251	93.1	14	5.2	265	98.3	5	1.7	270
Furniture Factories	1139	68.5	407	24.5	1546	93.0	117	7.0	1663
Furniture Stores	152	79.8	31	16.2	183	96.0	8	4.0	191
Garages	672	71.7	246	26.2	918	97.9	20	2.1	938
Garbage Reduction Plants	3	60.0	1	20.0	4	80.0	1	20.0	5
Gas Works	4	50.0	3	37.5	7	87.5	1	12.5	8
General Stores	1	50.0	1	50.0	2	100.0	0	..	2
Glass Factories	112	60.9	54	29.3	166	90.2	18	9.2	184
Glove Factories	22	66.7	10	30.3	32	97.0	1	3.0	33
Glue Factories	10	45.5	9	40.9	19	86.4	3	13.6	22
Grain Elevators	45	43.2	32	30.8	77	74.0	27	26.0	104
Groceries	234	78.4	53	17.7	287	96.1	12	3.9	299
Gum Mfg.	10	83.5	2	16.5	12	100.0	0	..	12
Hair Works	30	81.0	7	19.0	37	100.0	0	..	37
Hardware Stores	134	82.3	26	16.0	160	98.3	3	1.7	163
Hat Factories	491	80.7	97	15.9	588	96.6	21	3.4	609
Hospitals	37	80.4	9	19.6	46	100.0	0	..	46
Hotels—Year Round	129	82.8	22	14.1	151	96.9	5	3.1	156
Hotels—Seasonal	18	66.7	8	29.6	26	96.3	1	3.7	27
Ice Cream Mfg.	7	58.3	5	41.7	12	100.0	0	..	12
Ice Houses	0	..	2	66.7	2	66.7	1	33.3	3
Ice Manufacturing	2	66.7	1	33.3	3	100.0	0	..	3
Idle and Vacant Property	51	52.7	20	20.6	71	73.3	26	26.7	97
Incandescent Lamp Works	27	67.5	13	32.5	40	100.0	0	..	40
Institutions	17	94.6	1	3.4	18	100.0	0	..	18
Insulated Wire Works	69	67.0	32	31.1	101	98.1	2	1.9	103
Jewelry Factories	219	83.4	36	13.7	255	97.1	8	2.9	263
Junk Shops	34	64.3	14	26.4	48	90.7	5	9.3	53
Knitting Mills—Cop Yarn	72	67.9	27	25.4	99	93.3	7	6.7	106
Knitting Mills—Full Process	708	69.6	278	27.3	986	96.9	33	3.1	1019
Lamp Shade Factories	56	93.4	3	5.0	59	98.4	1	1.6	60
Laundries	203	74.4	62	22.7	265	97.1	8	2.9	273
Leather Working	262	83.4	47	14.9	309	98.3	5	1.7	314
Linoleum Works	41	30.4	74	54.9	115	85.3	20	14.7	135
Linseed Oil Works	31	56.4	16	29.2	47	85.6	8	14.4	55
Lumber Yards	8	57.1	6	42.9	14	100.0	0	..	14
Macaroni Factories	14	66.7	5	23.8	19	90.5	2	9.5	21
Machine Shops and Works	533	73.2	163	22.4	696	95.6	33	4.4	729
Mail Order Houses	67	87.0	10	13.0	77	100.0	0	..	77
Match Factories	80	76.9	19	18.3	99	95.2	5	4.8	104

	Extinguished Fire		Held Fire in Check		Total Satisfactory		Unsatisfactory		Total No. of Fires
	No.	%	No.	%	No.	%	No.	%	
Mattress Factories	702	71.9	257	26.3	959	98.2	17	1.8	976
Mercantile (Miscellaneous)	1162	81.9	207	14.8	1369	96.7	33	3.3	1402
Metal Reduction Plants	11	61.2	7	38.8	18	100.0	0	..	18
Metal Workers†	1386	65.2	656	30.8	2042	96.0	81	4.0	2123
Mining Property	5	62.5	2	25.0	7	87.5	1	12.5	8
Mirror Mfg.	22	88.0	2	8.0	24	96.0	1	4.0	25
Miscellaneous	459	75.1	129	21.1	588	96.2	24	3.8	612
Motion Picture Exchanges	56	76.8	14	19.2	70	96.0	3	4.0	73
Motion Picture Studios	51	76.2	16	23.8	67	100.0	0	..	67
Motion Picture Theatres	103	81.2	18	14.2	121	95.4	6	4.6	127
Multiple Occupancy	179	79.9	29	12.9	208	92.8	16	7.2	224
Munitions	25	42.4	24	40.7	49	83.1	10	16.9	59
Musical Instrument Factories	169	70.5	64	26.6	233	97.1	7	2.9	240
Office Buildings	125	89.4	15	10.6	140	100.0	0	..	140
Oil Cloth Works	34	48.6	29	41.4	63	90.0	7	10.0	70
Oil Clothing Factories	26	86.6	3	10.0	29	96.6	1	3.4	30
Oil Distributing Station	2	40.0	3	60.0	5	100.0	0	..	5
Oil Refineries—Animal	4	50.0	3	37.5	7	87.5	1	12.5	8
Oil Refineries—Mineral	7	58.3	4	33.3	11	91.6	1	8.4	12
Oil Refineries—Vegetable	12	44.5	12	44.5	24	89.0	3	11.0	27
Optical Works	23	63.9	13	36.1	36	100.0	0	..	36
Packing Houses	213	67.9	87	27.8	300	95.7	13	4.3	313
Paint and Varnish Works	337	65.9	154	30.1	491	96.0	20	4.0	511
Paper Coating Mills	44	63.8	19	27.5	63	91.3	6	8.7	69
Paper Mills	741	52.9	535	38.2	1276	91.1	124	8.9	1400
Paper Working	460	76.0	133	22.0	593	98.0	12	2.0	605
Peanut Roasting Plants	7	53.8	3	23.1	10	76.9	3	23.1	13
Pencil Factories	20	69.0	8	27.5	28	96.5	1	3.5	29
Phonograph Works	34	66.7	15	29.4	49	96.1	2	3.9	51
Photo Camera and Film Mfg.	25	69.5	11	30.5	36	100.0	0	..	36
Photo Engraving and Studios	66	88.0	8	10.7	74	98.7	1	1.3	75
Picture Frame Mfg.	67	67.6	26	26.3	93	93.9	6	6.1	99
Piers and Wharves	27	55.1	19	38.8	46	93.9	3	6.1	49
Plumbers' Supplies	44	74.5	12	20.4	56	94.9	3	5.1	59
Potteries	62	64.6	26	27.1	88	91.7	8	8.3	96
Printing and Lithographing	1320	83.1	243	15.3	1563	98.4	27	1.6	1590
Prisons	5	45.4	4	36.3	9	81.7	2	18.3	11
Public Buildings	12	75.0	3	18.7	15	93.7	1	6.3	16
Pulp Mills	53	39.0	56	41.2	109	80.2	27	19.8	136
Pyroxylin Plastic Mfg. Fabricating	285	67.5	96	22.7	381	90.2	41	9.8	422
Radios and Accessories	70	82.4	13	15.3	83	97.7	2	2.3	85
Railroad—Misc. Property	5	31.2	10	62.4	15	93.6	1	6.4	16
Railroad—Repair Shops	4	40.0	6	60.0	10	100.0	0	..	10
Rayon Mills	31	81.5	5	13.1	36	94.6	2	5.4	38
Restaurants	227	75.7	70	23.3	297	99.0	3	1.0	300
Rice Mills	2	25.0	2	25.0	4	50.0	4	50.0	8
Rolling, Wire and Tube Mills	93	64.6	46	31.9	139	96.5	5	3.5	144
Roofing Works	51	36.4	78	55.6	129	92.0	11	8.0	140
Rooming and Lodging Houses	10	91.0	0	..	10	91.0	1	9.0	11
Rubber Cloth Factories	104	68.0	45	29.4	149	97.4	4	2.6	153
Rubber Reclaiming Works	23	53.4	10	23.3	33	76.7	10	23.3	43
Rubber Mills	321	57.4	210	37.6	531	95.0	28	5.0	559
Salt Works	2	50.0	2	50.0	4	100.0	0	..	4
Saw and Planing Mills	126	42.0	94	31.3	220	73.3	80	26.7	300
Schools—Colleges and Universities	21	87.5	3	12.5	24	100.0	0	..	24
Schools—Private	7	70.0	2	20.0	9	90.0	1	10.0	10
Schools—Public	9	60.0	3	20.0	12	80.0	3	20.0	15
Schools—Trade and Industrial	14	82.4	2	11.8	16	94.2	1	5.8	17
Shipyards	18	56.3	13	40.7	31	97.0	1	3.0	32
Shoddy Mills	287	64.8	132	29.7	419	94.5	24	5.5	443

	Extinguished Fire		Held Fire in Check		Total Satisfactory		Unsatisfactory		Total No. of Fires
	No.	%	No.	%	No.	%	No.	%	
Shoe Factories	1063	75.8	290	20.7	1353	96.5	49	3.5	1402
Shoe Mfg. Accessories	111	70.7	39	24.8	150	95.5	7	4.5	157
Shoe Stores	90	87.3	13	12.7	103	100.0	0	..	103
Silk Mills	206	82.4	37	14.7	243	97.1	8	2.9	251
Smelting and Refining	8	66.7	4	33.3	12	100.0	0	..	12
Soap Manufacturing	60	72.2	20	24.1	80	96.3	3	3.7	83
Stables	24	75.0	8	25.0	32	100.0	0	..	32
Stamping and Sheet Metal Works	206	63.7	100	30.9	306	94.6	18	5.4	324
Starch and Glucose	16	53.3	6	20.0	22	73.3	8	26.7	30
Stone Working	4	100.0	0	..	4	100.0	0	..	4
Sugar Refineries	42	52.5	35	43.7	77	96.2	3	3.8	80
Tannery, Class A**	22	40.8	27	50.0	49	90.8	5	9.2	54
Tannery, Class B**	144	58.1	83	33.4	227	91.5	21	8.5	248
Tannery, Class C**	19	43.2	20	45.4	39	88.6	5	11.4	44
Tannery, Class D**	29	70.5	10	24.4	39	94.9	2	5.1	41
Telephone Exchanges	3	100.0	0	..	3	100.0	0	..	3
Tenant Manufacturing	2037	79.4	433	16.8	2470	96.2	94	3.8	2564
Theatres	104	76.5	25	18.4	129	94.9	7	5.1	136
Tobacco Factories	99	75.5	28	21.3	127	96.8	4	3.2	131
Tobacco Warehouses	8	61.5	4	30.8	12	92.3	1	7.7	13
Trunk Factories	45	72.6	10	16.1	55	88.9	7	10.1	62
Umbrella Mfg.	22	81.5	4	14.8	26	96.3	1	3.7	27
Vinegar Works	1	100.0	0	..	1	100.0	0	..	1
Wall Paper Factories	29	74.4	6	15.4	35	89.8	4	10.2	39
Warehouses	540	74.8	149	20.7	689	95.5	32	4.5	721
Waste and Batting Mills	423	61.2	238	34.4	661	95.6	30	4.4	691
Waste Paper and Rag Shops	296	65.2	135	29.7	431	94.9	23	5.1	454
Waterworks	1	33.3	2	66.7	3	100.0	0	..	3
Weaving Mills	211	68.9	87	28.4	298	97.3	8	2.7	306
Window Shade Factories	18	75.0	4	16.7	22	91.7	2	8.3	24
Woodworker, Class A*	220	55.2	127	31.9	347	87.1	52	12.9	399
Woodworker, Class B*	219	53.8	150	36.9	369	90.7	38	9.3	407
Woodworker, Class C*	219	62.5	112	31.9	331	94.4	20	5.6	351
Woodworker, Class D*	146	56.6	87	33.7	233	90.3	25	9.7	258
Woodworker, Class E*	206	64.4	97	30.2	303	94.6	17	5.4	320
Woodworker, Class F*	49	59.8	27	32.9	76	92.7	6	7.3	82
Woodworker, Class G*	2	16.7	9	75.0	11	91.7	1	8.3	12
Woodworker, Class H*	97	78.8	25	20.4	122	99.2	1	.8	123
Woolen Mills	1283	70.3	461	25.2	1744	95.5	82	4.5	1826
Wool Scouring Plants	44	68.8	17	26.6	61	95.4	3	4.6	64
Wool Storehouses	35	68.7	13	25.5	48	94.2	3	5.8	51
Worsted Mills	109	60.6	56	31.1	165	91.7	15	8.3	180
Total	40,468		15,043		55,511		2,297		57,808

*The Woodworkers are classified as follows:

Class A. Interior Woodwork, builders' supplies (including veneer works).

Class B. Box Factories (including cigar boxes).

Class C. Miscellaneous Woodworkers. Steam power tenant Woodworkers. Woodworkers where there is a lack of detailed information as to class.

Class D. Sash, Door and Blind Factories.

Class E. Hard Wood Turning (wheels, pipes, novelties, bobbins, spools, etc.).

Class F. Pails and Woodenware (plates, wooden bowls, tubs, etc.).

Class G. Wood Flour Mills.

Class H. Wood Heel and Shoe Last Factories.

†Other Metal Working Occupancies are included under Agricultural Implements; Automobile and Bicycle Factories; Bolt, Nut and Screw Works; Electrical Appliances; Forge and Smithy; Foundries; Machine Works; Rolling, Wire and Tube Works; and Stamping and Sheet Metal Works.

**See detailed classification of Tanneries as given in note under Table No. 5.

Table No. 5 — Classification of Unsatisfactory Sprinkler Fires by Occupancy.

	Water shut off sprinklers.	Generally defective equipment and unsprinklered portions.	Defective water supply or supplies.	Sprinkler system crippled due to freezing.	Slow operation of dry system or defective dry valve.	Slow or defective operation of high test heads.	Faulty building construction, concealed spaces, vertical openings.	Obstruction to distribution.	Hazard of occupancy too severe for average sprinkler equipment.	Sprinkler system crippled by explosion.	Exposure or conflagration.	Plugged heads and clogged piping.	Miscellaneous.	Total.	Total No. of Fires
Abrasive Works	..	1	..	..	..	..	..	..	..	..	..	1	2		1402
Agricultural Implements	3	1	..	..	..	..	..	1	..	..	..	..	..	5	157
Alcohol Distilleries	..	..	..	..	..	..	..	..	..	1	..	..	..	1	103
Aluminum Works	..	..	..	..	..	..	..	..	1	1	..	..	..	2	251
Amusement Places	2	..	..	..	..	..	1	..	..	..	..	1	..	4	12
Artificial Leather Mfg.	..	..	..	..	..	..	1	..	..	2	..	..	..	3	83
Asbestos Work	..	..	2	..	..	..	..	..	..	1	..	..	..	3	32
Automobile Mfg.	8	3	2	..	1	..	..	4	..	2	1	1	..	22	324
Auto Body Mfg.	5	6	3	..	2	..	1	3	1	1	3	1	1	27	30
Auto Sales and Service	3	1	..	1	..	..	..	..	..	1	..	..	..	6	4
Bag Factories	1	..	..	..	..	1	..	1	..	..	..	1	..	4	80
Bakeries	4	1	..	..	..	..	1	..	..	..	..	..	2	8	54
Basket Factories	..	..	..	..	..	..	..	..	..	..	1	..	..	1	248
Battery Mfg.	2	..	..	..	..	..	..	..	..	..	..	1	..	3	44
Bolt, Nut, and Screw Works	1	2	..	..	..	..	..	..	..	..	..	..	..	3	41
Bottling Works	..	1	..	..	..	..	..	..	..	..	..	..	..	1	3
Braid Mills	..	1	..	..	..	..	..	1	..	..	..	..	..	2	306
Brass and Copper Works	1	1	..	..	..	..	..	..	..	..	..	..	1	3	24
Broom Factories	3	..	..	..	..	..	..	..	..	..	..	..	..	3	399
Brush Factories	..	..	..	1	..	..	..	..	..	..	..	..	..	1	407
Building Construction	1	..	..	..	..	..	..	..	..	..	..	..	..	1	351
Button Factories	..	..	..	2	..	..	..	..	..	..	..	..	..	2	258
Candy Factories	4	..	..	1	1	..	2	..	1	..	1	1	1	12	320
Canneries	1	..	..	..	1	..	..	..	..	..	1	..	..	3	82
Car Houses	2	3	1	..	1	..	..	1	..	..	..	1	..	9	12
Car Works	2	1	..	..	..	..	1	1	..	..	..	..	..	5	123
Carpet and Rug Mills	4	3	3	1	..	..	..	2	..	..	..	..	..	13	1826
Casket Mfg.	2	..	..	1	1	..	1	..	..	..	..	..	..	5	64
Cement and Plaster Mills	1	1	..	..	1	..	..	..	..	..	..	..	..	3	51
Cereal Mills	..	2	1	..	..	..	..	1	..	4	..	..	..	8	180
Chemical & White Lead Wks.	3	6	..	..	..	..	..	1	6	9	1	..	1	27	57,808
Clothing Mfg.	7	2	2	1	..	..	4	2	..	..	2	1	2	23	
Clubs—City	..	..	..	..	..	..	1	..	..	..	..	..	..	1	
Coal and Wood Yards	..	..	1	..	..	..	..	..	..	..	..	..	..	1	Wood-
Coffee and Spice Plants	2	..	..	..	..	..	..	1	..	1	..	..	..	4	
Cooperage Plants	1	4	..	..	..	1	..	4	..	..	2	..	..	12	
Cordage Works	5	5	1	1	..	..	..	3	..	..	..	..	1	16	
Cork Plants	1	..	1	..	..	..	..	..	2	1	..	..	1	6	
Cotton Gins	1	1	..	..	..	..	..	..	..	..	..	..	..	2	
Cotton Mills	43	27	11	2	2	1	5	3	3	1	..	6	14	118	nents;
Cotton Seed Oil Mills	4	7	4	..	..	..	..	..	3	..	..	1	2	21	ances;
Cotton Warehouses	16	3	8	..	2	..	1	8	3	..	..	4	3	48	; and
Cutlery Mfg.	1	1	1	..	..	..	..	..	..	..	..	..	..	3	
Department Stores	12	4	1	..	2	..	1	1	..	..	2	..	1	24	
Distilleries	1	..	..	..	..	..	..	..	..	1	1	..	1	4	
Drug Mfg. and Warehouses	2	..	..	..	1	..	..	..	..	..	3	..	1	7	
Dry Goods Stores	4	..	..	..	..	..	1	1	..	..	..	..	..	6	

	Water shut off sprinklers.	Generally defective equipment and unsprinklered portions.	Defective water supply or supplies.	Sprinkler system crippled due to freezing.	Slow operation of dry system or defective dry valve.	Slow or defective operation of high test heads.	Faulty building construction, concealed spaces, vertical openings.	Obstruction to distribution.	Hazard of occupancy too severe for average sprinkler equipment.	Sprinkler system crippled by explosion.	Exposure or conflagration.	Plugged heads and clogged piping.	Miscellaneous.	Total.
Dwellings	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Dyeing, Bleaching, Finishing	7	3	1	..	1	2	..	2	..	..	1	1	1	19
Electrical Appliance Mfg.	3	..	2	..	..	..	1	2	..	1	..	1	3	13
Electric Power and Light	2	1	..	..	..	..	..	1	..	..	..	..	..	4
Excelsior Factories	..	..	2	..	1	..	..	..	1	..	..	..	..	4
Fertilizer Plants	2	1	..	..	1	..	..	..	..	..	..	..	..	4
Fibre Products	1	..	1	..	..	..	..	..	..	..	..	1	..	3
Fireworks Plants	..	..	..	..	..	..	..	..	..	2	..	..	..	2
Flax and Linen Mills	1	..	..	..	..	..	..	..	..	..	..	..	..	1
Flour and Grist Mills	10	5	2	..	1	..	1	1	2	6	2	..	2	32
Forge and Smithy	..	..	..	..	..	..	..	1	..	..	..	..	..	1
Foundries	14	..	1	..	1	..	1	1	..	2	..	..	..	20
Fur Works	1	1	..	..	..	..	2	..	..	..	..	..	1	5
Furniture Factories	39	24	10	4	1	..	4	12	12	1	4	4	2	117
Furniture Stores	6	..	..	..	1	..	1	..	..	..	..	..	..	8
Garages	12	..	..	2	1	..	..	3	..	1	..	..	1	20
Garbage Reduction Plants	1	..	..	..	..	..	..	..	..	..	..	..	..	1
Gas Works	..	1	..	..	..	..	..	..	..	..	..	..	..	1
Glass Factories	4	4	2	1	..	..	3	1	..	..	..	..	3	18
Glove Factories	1	..	..	..	..	..	..	..	..	..	..	..	..	1
Glue Factories	2	..	..	..	..	..	..	..	1	..	..	..	..	3
Grain Elevators	1	5	5	..	4	..	2	1	1	5	2	..	1	27
Groceries	7	..	1	..	1	..	1	..	1	1	..	..	..	12
Hardware Stores	2	..	..	..	..	..	..	..	..	..	..	..	1	3
Hat Factories	9	4	2	..	1	..	..	2	..	..	..	..	3	21
Hotels—Year Round	2	1	1	..	..	..	1	..	..	..	..	..	..	5
Hotels—Seasonal	..	..	..	..	..	..	1	..	..	..	..	..	..	1
Ice Houses	1	..	..	..	..	..	..	..	..	..	..	..	..	1
Idle and Vacant Property	18	1	..	3	..	..	1	1	..	..	1	1	..	26
Insulated Wire Works	..	2	..	..	..	..	..	..	..	..	..	..	..	2
Jewelry Factories	4	1	..	2	..	..	1	..	..	..	..	..	..	8
Junk Shops	3	..	..	..	1	..	..	..	..	..	1	..	..	5
Knitting Mills—Cop Yarn	1	1	3	..	..	..	..	1	..	1	..	..	..	7
Knitting Mills—Full Process	12	10	6	1	1	..	1	..	..	1	..	1	..	33
Lamp Shade Factories	..	..	1	..	..	..	..	..	..	..	..	..	..	1
Laundries	6	..	1	..	..	..	..	1	..	..	..	..	..	8
Leather Working	1	..	1	..	1	..	..	1	..	..	..	..	1	5
Linoleum Works	..	8	1	..	..	..	2	2	7	..	..	..	..	20
Linseed Oil Works	1	1	..	..	..	..	1	..	1	2	..	2	..	8
Macaroni Factories	2	..	..	..	..	..	..	..	..	..	..	..	..	2
Machine Shops and Works	19	6	1	1	..	1	..	..	1	2	..	2	..	33
Match Factories	2	..	..	..	..	..	..	..	2	..	..	..	1	5
Mattress Factories	12	2	..	1	..	..	..	2	..	..	..	..	..	17
Mercantile (Miscellaneous)	13	6	1	2	..	..	5	..	..	..	4	..	2	33
Metals Workers†	26	18	4	1	1	2	5	4	6	5	3	3	3	81
Mining Property	..	1	..	..	..	..	..	..	..	..	..	..	..	1
Mirror Mfg.	..	..	..	..	..	..	1	..	..	..	..	..	..	1
Miscellaneous	4	5	1	..	2	1	3	..	5	..	1	..	2	24

	Water shut off sprinklers.	Generally defective equipment and unsprinklered portions.	Defective water supply or supplies.	Sprinkler system crippled due to freezing.	Slow operation of dry system or defective dry valve.	Slow or defective operation of high test heads.	Faulty building construction, concealed spaces, vertical openings.	Obstruction to distribution.	Hazard of occupancy too severe for average sprinkler equipment.	Sprinkler system crippled by explosion.	Exposure or conflagration.	Plugged heads and clogged piping.	Miscellaneous.	Total.
Motion Picture Exchanges	..	..	..	..	1	..	..	..	2	..	..	..	..	3
Motion Picture Theatres	2	1	..	..	..	..	..	1	..	1	1	..	..	6
Multiple Occupancy	4	1	1	1	1	..	5	..	..	2	..	..	1	16
Munition Plants	2	..	..	1	..	..	..	..	4	2	..	..	1	10
Musical Instrument Mfg.	1	4	..	..	..	..	1	..	..	..	1	..	..	7
Oil Cloth Works	..	..	..	..	..	..	..	1	6	..	..	..	..	7
Oil Clothing Factories	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Oil Refineries—Animal	..	..	1	..	..	..	..	..	..	..	..	..	..	1
Oil Refineries—Mineral	..	..	..	..	..	1	..	..	..	..	..	..	..	1
Oil Refineries—Vegetable	2	..	1	..	..	..	..	..	..	..	..	..	..	3
Packing Houses	5	2	1	..	2	..	..	..	1	1	..	..	1	13
Paint and Varnish Works	3	3	6	..	1	..	3	1	..	3	..	..	..	20
Paper Coating Mills	2	..	..	..	..	..	..	2	..	1	..	..	1	6
Paper Mills	29	27	18	5	2	3	2	10	4	3	3	7	11	124
Paper Working	6	1	..	..	1	..	..	2	1	..	..	1	..	12
Peanut Roasting Plants	..	..	1	..	..	..	..	..	..	..	2	..	..	3
Pencil Factories	..	..	..	..	..	..	..	..	..	1	..	..	..	1
Phonograph Works	2	..	..	..	..	..	..	..	..	..	..	..	..	2
Photo Engraving & Studios	1	..	..	..	..	..	..	..	..	..	..	..	..	1
Picture Frame Mfg.	1	2	1	1	..	..	..	1	..	..	..	..	..	6
Piers and Wharves	..	2	1	..	..	..	..	..	..	..	..	..	..	3
Plumbers' Supplies	2	1	..	..	..	..	..	..	..	..	..	..	..	3
Potteries	3	2	1	1	..	..	..	..	..	1	..	..	..	8
Printing and Lithographing	11	5	1	..	1	..	3	1	1	..	3	..	1	27
Prisons	..	..	..	..	1	..	..	..	1	..	..	..	..	2
Public Buildings	..	..	..	..	1	..	..	..	..	..	..	..	..	1
Pulp Mills	12	4	4	..	1	1	1	..	1	1	..	..	2	27
Pyroxylin Plastic Mfg. and Fabricating	4	1	3	1	1	..	2	2	19	6	2	..	..	41
Radios and Accessories	1	..	..	..	..	..	..	..	..	..	..	1	..	2
Railroad—Misc. Property	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Rayon Mills	..	1	..	..	..	..	..	..	..	..	..	..	1	2
Restaurants	1	1	..	..	..	..	1	..	..	..	..	..	..	3
Rice Mills	..	1	1	..	..	..	..	..	..	..	..	..	2	4
Rolling, Wire & Tube Mills	..	1	..	..	1	1	1	..	..	..	..	1	..	5
Roofing Works	3	2	1	1	..	..	1	2	..	1	..	..	..	11
Rooming & Lodging Houses	1	..	..	..	..	..	..	..	..	..	..	..	..	1
Rubber Cloth Factories	2	1	..	..	..	..	..	..	..	..	..	..	1	4
Rubber Reclaiming Works	3	..	1	..	..	..	1	1	2	1	1	..	..	10
Rubber Mills	9	1	..	1	..	..	..	1	7	7	..	1	1	28
Saw and Planing Mills	21	15	7	1	6	1	6	4	8	..	5	1	5	80
Schools—Private	..	1	..	..	..	..	..	..	..	..	..	..	..	1
Schools—Public	1	1	..	..	..	..	1	..	..	..	..	..	..	3
Schools—Trade & Industrial	1	..	..	..	..	..	..	..	..	..	..	..	..	1
Shipyards	1	..	..	..	..	..	..	..	..	..	..	..	..	1
Shoddy Mills	6	3	7	1	1	3	1	1	..	..	..	..	1	24
Shoe Factories	19	8	3	..	1	1	2	3	..	3	6	..	3	49
Shoe Mfg. Accessories	3	2	..	1	..	..	..	..	..	..	..	..	1	7

	Water shut off sprinklers.	Generally defective equipment and unsprinklered portions.	Defective water supply or supplies.	Sprinkler system crippled due to freezing.	Slow operation of dry system or defective dry valve.	Slow or defective operation of high test heads.	Faulty building construction, concealed spaces, vertical openings.	Obstruction to distribution.	Hazard of occupancy too severe for average sprinkler equipment.	Sprinkler system crippled by explosion.	Exposure or conflagration.	Plugged heads and clogged piping.	Miscellaneous.	Total.
Silk Mills	3	2	..	..	..	..	..	..	..	1	..	..	2	8
Soap Manufacturing	2	1	..	..	..	..	..	..	..	..	..	..	..	3
Stamping & Sht. Metal Wks.	4	5	1	..	1	..	2	1	..	1	2	..	1	18
Starch and Glucose Works..	..	..	..	..	..	..	..	..	1	7	..	..	..	8
Sugar Refineries	1	1	..	..	..	..	..	..	..	1	..	..	..	3
Tannery, Class A**	1	1	..	1	..	..	..	..	..	..	1	..	1	5
Tannery, Class B**	9	4	..	2	3	..	1	1	..	..	..	..	1	21
Tannery, Class C**	1	..	1	1	..	..	1	..	..	..	1	..	..	5
Tannery, Class D**	..	..	..	2	..	..	..	..	..	..	..	..	..	2
Tenant Manufacturing	54	10	2	5	1	..	4	3	2	1	7	2	3	94
Theatres	4	3	..	..	..	..	..	..	..	..	..	..	..	7
Tobacco Factories	1	1	..	..	..	..	..	..	1	..	1	..	..	4
Tobacco Warehouses	..	..	..	..	..	..	..	..	..	..	1	..	..	1
Trunk Factories	3	1	1	..	..	..	1	..	..	..	1	..	..	7
Umbrella Mfg.	..	..	..	..	..	..	..	..	..	1	..	..	..	1
Wall Paper Factories	..	..	1	..	..	..	..	1	1	..	1	..	..	4
Warehouses	12	4	3	..	2	..	3	2	2	..	..	1	3	32
Waste and Batting Mills	8	4	5	2	2	1	..	2	2	..	..	3	1	30
Waste Paper & Rag Sorting	12	4	1	3	..	..	..	1	..	..	..	..	2	23
Weaving Mills	1	2	2	1	..	..	..	2	..	..	..	..	..	8
Window Shade Factories	..	..	..	1	..	..	..	..	1	..	..	..	..	2
Woodworker, Class A*	13	10	5	4	2	1	2	6	1	3	3	1	4	52
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Woodworker, Class C*	7	5	3	..	..	..	1	3	..	..	..	..	1	20
Woodworker, Class D*	3	11	..	1	1	..	..	..	..	2	4	..	3	25
Woodworker, Class E*	6	1	1	..	2	1	2	..	1	..	1	1	1	17
Woodworker, Class F*	2	1	1	..	..	..	..	2	..	..	..	..	..	6
Woodworker, Class G*	..	..	..	..	..	..	..	..	..	1	..	..	..	1
Woodworker, Class H*	..	1	..	..	..	..	..	..	..	..	..	..	..	1
Woolen Mills	21	21	17	2	..	2	4	1	1	..	3	4	6	82
Wool Scouring Plants	..	1	1	..	..	..	1	..	..	..	..	..	..	3
Wool Storehouses	1	2	..	..	..	..	..	..	..	..	..	..	..	3
Worsted Mills	3	4	2	1	..	..	1	..	..	..	..	..	4	15
Total	751	403	202	70	72	27	114	137	130	111	89	63	128	2297

†See note on Metal Workers under Table No. 4.

*See detailed classification of Woodworkers as given in note under Table 4.

**The Tanneries are classified as follows:

Class A. Sole Leather and Belting.
Class B. Upper Leather (Calfskins, Sheepskins, Morocco).
Class C. Patent Leather.
Class D. Skin Mills (Glove Leather).

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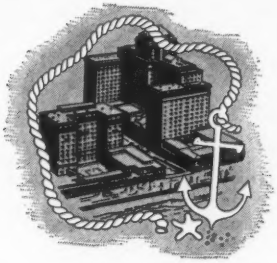

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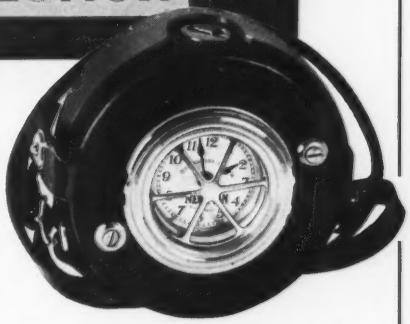
DETECTION
A *First* PRINCIPLE IN FIRE PROTECTION



THE WATCHMAN is generally recognized as fundamental in insurance engineering and fire prevention practice. The system that checks the watchman is granted equal importance.

A Detex Watchmen's system is the simplest, most economical way of making watchmen's service efficient. Detex Watchman's Clocks are the product of a company building watchmen's systems exclusively for more than 50 years—with 80,000 clocks in use in 50,000 systems.

The complete Detex line includes more than a dozen models: Portable —Electric—Stationary—Watchman's Clocks—each designed to serve a particular purpose. . . .

Among them there is one that will best meet any plant's requirements.

Detex Watchman's Clocks are approved by the Underwriters' Laboratories, Inc., and by Factory Mutual Laboratory.

DETEX WATCHCLOCK CORPORATION

4163 Ravenswood Avenue, Chicago, Ill. — 31 Beach Street, Boston
84 Varick Street, New York — Room 802, 122 Marietta Street, Atlanta

DETEX

WATCHMEN'S CLOCKS

NEWMAN ★ ECO ★ ALERT ★ PATROL

SAFE FILM

FOR THE CLINIC

●

EVERY Eastman film recommended for clinical photography is available on "safety" base, rated by underwriters as involving even less hazard than so much newsprint paper.

●

EASTMAN KODAK COMPANY

ROCHESTER, N. Y.

Announcing the new

BENJAMIN Dust-Tight Grain Bin Inspection Portable

Designed to conform to specifications of Underwriters' Laboratories for portable units in Class II, Group G, Hazardous Locations.

This new Benjamin Grain Bin Inspection Portable fills a long felt need by grain elevator operators, owners, and Insurance Underwriters for a portable lighting unit which can be lowered into grain bins for inspection of the grain levels or to aid in servicing the bin interiors without the danger of a dust explosion.

The portable has been designed to meet the rigid safety requirements of the Underwriters' Laboratories for portable lighting units in Class II, Group G, Hazardous atmospheric locations, under which grain bin interiors are classified.

In this lightweight but durably constructed portable, the lamp is entirely enclosed. The housing is dust tight, while the bottom opening is provided with a gasketed glass cover; protected by a non-ferrous metal guard, which also acts as a stand. The fixture housing is streamlined to prevent dust accumulation. Special insulation keeps housing temperatures low. The portable is designed to take standard No. 16 gauge, type "S," three-conductor rubber covered cable.

Write for bulletin AD 3795, giving complete description, list prices and other data.

BENJAMIN ELECTRIC MFG. CO.

DES PLAINES, ILLINOIS

NEW YORK
230-234 W. 17th Street

CHICAGO
20 N. Wacker Drive

DORMITORY FIRE automatically discovered in FAMOUS WOMEN'S COLLEGE by GAMEWELL SPRINKLER SUPERVISORY EQUIPMENT

•

Within a few seconds after a sprinkler head operated in Cazenove Hall, Wellesley College, and deluged water upon a fire in a student's room, a ***Multifold*** Fire Alarm Box mounted outside the dormitory, tripped automatically and flashed its alarm directly to the Wellesley municipal fire deparment.

Firemen responding, arrived at the dormitory before the occupants were aware that a fire had broken out. The Rockwood sprinkler system had effectively extinguished the fire and the fire department immediately shut off the sprinklers and prevented unnecessary water damage.

The loss was confined to within $500.00, yet it might have been considerably greater since the building in which the fire occurred is one of four closely grouped dormitories housing more than 500 students and having an insurable value of about $2,000,000. Thus, the value of having the automatic sprinklers in each dormitory connected to the municipal fire alarm system is clearly evident.

This simple and practical connection, often referred to as the Gamewell ***Sprinkler Watchman***, is an invaluable aid to every municipal fire department and a real protection to every sprinklered property.

Through the recommendations of many fire insurance and fire department officials, hundreds of these ***Sprinkler Watchman*** connections are now in service. Every insurance rating organization should encourage owners of sprinklered properties to connect their sprinkler systems with the municipal fire department in this ***direct manner.*** Write for a copy of our booklet Q1200 describing the ***Sprinkler Watchman.***

•

THE GAMEWELL COMPANY

NEWTON, MASSACHUSETTS

Fire Protection Keeps Step With Modern Science

Modern science has introduced materials and processes which have greatly increased manufacturing efficiency. This has, however, also introduced special fire hazards which must be handled by improved and special fire extinguishing equipment.

Fire Protection Engineers who have given this matter serious study have, in many cases, recommended Rockwood Dualguard Deluge Equipment to provide extraordinary protection to meet extraordinary conditions.

A new booklet has been published which not only describes the regular Dualguard System, but also contains interesting illustrations and descriptions of special equipment for special hazards. A copy will be gladly sent on request.

•

ROCKWOOD SPRINKLER COMPANY

WORCESTER, MASS. CHICAGO, ILL.

Sole Representative for Canada

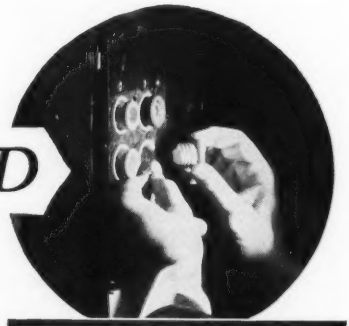
WORCESTER FIRE EXTINGUISHER CO., Ltd.

MONTREAL TORONTO

NOFUZE WIRING PROTECTION

banishes

THIS HAZARD



IN a recent three-day check-up of a certain city's fuse boxes, a safety inspector accumulated three pecks of bridged fuses and about $4 in pennies, nickels and dimes (mostly pennies).

Fuseless wiring protection . . . now possible with Westinghouse NOFUZE devices . . . puts an end to such hazards. Nofuze wiring protection is tamper-proof!

With Nofuze wiring, accurately calibrated "De-ion" circuit breakers replace fuses. When a short-circuit or heavy overload occurs, the breaker protecting the affected circuit automatically opens. After the overload is removed, service can be restored instantly by a mere flip of the breaker handle.

Nofuze devices can't be blocked or bridged. Their calibration can't be changed because the breaker is sealed in a molded block at the factory. They are approved by the Underwriters' Laboratories.

You will be asked about Nofuze wiring protection. The coupon will bring you complete information.

Westinghouse Nofuze Wiring Protection is available for homes, buildings and industrial plants.

Westinghouse

Quality workmanship guarantees every Westinghouse product

SEND FOR INFORMATION

Westinghouse Electric & Manufacturing Co.
Room 2-N—East Pittsburgh, Pa.

Gentlemen: Please send information on NOFUZE wiring protection.

Name .....

Address .....T 79773

City.....*State*.....NFPQ 4-36

The New Building Activity Finds Viking Ready--

• New building is again on the march. The sound of the Hammer and Saw again resound throughout America, in the construction of buildings which meet new demands and requirements of industry and business.

• The new demands for Automatic Sprinkler Systems which exactly meet every special requirement and thereby provide maximum protection and greatest insurance economies find Viking ready.

• Viking has engineered three types of systems which embody every modern engineering refinement. The Viking Dry Pipe and Wet Pipe Systems for ordinary risks; the Viking Pre-Action and Deluge System for extra hazardous risks.

• Viking is ready with the fire protection devices, the engineering service and the deferred payment plan which best meets industry's modern requirements.

Why Sprinkler Protection and what kind? This booklet answers these and many other questions—should be in the file of everyone interested in fire prevention — a copy on request.

VIKING

AUTOMATIC SPRINKLER SYSTEMS

CALL ON VIKING

Whenever you have need of the Services of a fire prevention engineer. There is no obligation for surveys and insurance cost analyses.

VIKING COMPANIES:

Atlanta, Ga.-Charlotte, N. C.—Crawford & Slaten Co.
Boston, Mass.—Viking Automatic Sprinkler Co.
Buffalo-Syracuse, N. Y.—Viking Automatic Sprinklers, Inc.
Chicago, Ill.—Viking Automatic Sprinkler Co.
Cincinnati-Cleveland, Ohio—Viking Sprinkler Co.
Dallas-Houston, Texas—Texas Automatic Sprinkler Co.
Detroit, Mich.—Viking Sprinkler Co.
Grand Rapids, Mich.—Viking Automatic Sprinkler Co.
Huntington, W. Va.—C. W. Hutchinson, Inc.
Indianapolis, Indiana—Indiana Automatic Sprinkler Co.
Kansas City-St. Louis, Mo.—Walton-Viking Co.
Los Angeles-San Francisco, Cal.—Viking Automatic Sprinkler Co.
Minneapolis, Minn.—Viking Automatic Sprinkler Co.
New York, N. Y.—Viking Automatic Sprinklers, Inc.
Philadelphia, Pa.—Viking Sprinkler Co. of Pa.
Seattle, Wash.-Portland, Ore.—Viking Automatic Sprinkler Co.
Toronto, Ontario—Toronto Viking Sprinklers, Ltd.

THE VIKING CORPORATION
HASTINGS, MICHIGAN

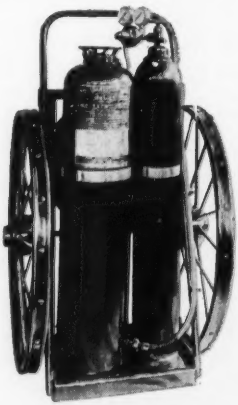
The DRY Method of Fire Control — Modern — Safest — Quickest

• The GARRISON DRY Method of fire control covers a wider range of types of fire than any other extinguishing medium. Utility engineers report it as "safest and quickest method of getting oil fires involving electrical equipment under control." Proven most quickly efficient in fire in grease, gasoline, lacquers, alcohol, ether and other volatile liquids. Available in apparatus, two types illustrated, for use in homes, institutions, factories (of any size), from the 3 lb. Garfire Gun to the most complete motor fire apparatus.

• Write for Complete Catalog.

GARRISON No. 20 First-Aid Appliance

Weight, 50 lbs.
Diameter, 7⅛ in.
Length 26 in.
Chromium finish.



GARRISON No. 100W

Weight, 450 lbs.
Width, 32 inches.
Height, 51 inches.
Wheels, 36 in.; 2½ in. face.
Capacity of powder tank, 100 lbs.
Pressure gas cylinder, 100 cu. ft.

GARRISON ENGINEERING CORPORATION

Factories and Executive Offices:
GREAT BARRINGTON, MASS.

A Complete Fire Control Service

Sole Manufacturing and Sales Licensee Covering All DuGas Fire Extinguishing Co. Patents, Also Garrison Patents Pending.

WHAT WILL THEY FIND WHEN THEY GET THERE?

WILL it be a small blaze, easily extinguished? Or a roaring inferno, already beyond control?

Fire fighters will answer this with still another question: "*How soon was the outbreak discovered and the alarm sent in?*" For they know from repeated personal experience that nine out of ten serious fires can be traced either to belated discovery or to delay in sending the alarm.

It is an encouraging fact that among the public, also, there seems to be a growing realization of the importance of the time element in fire protection. Throughout the country, more and more property owners are eliminating the hazards of belated discovery and delayed alarms through the installation of A. D. T. Automatic Fire Detecting and Reporting systems. By thus assuring prompt discovery and speedy and accurate alarms, the fire department is able to reach the scene of the fire in those vital first few minutes that so often spell the difference between a trivial blaze and disaster.

We shall be glad to send descriptive booklets which will enable Fire Chiefs to explain the advantages of A. D. T. Services to citizens who ask their advice on fire protection. Write A. D. T., 155 Sixth Avenue, New York City.

A. D. T. Central Station Fire Protection Services

"AERO" AUTOMATIC FIRE ALARM : : SPRINKLER SUPERVISORY AND WATERFLOW ALARM SERVICE : : WATCHMAN SUPERVISORY AND MANUAL FIRE ALARM SERVICES

Controlled Companies of AMERICAN DISTRICT TELEGRAPH COMPANY • 155 SIXTH AVENUE, NEW YORK, N. Y.

A.D.T. SYSTEM

A NATION-WIDE PROTECTION SERVICE AGAINST FIRE, BURGLARY AND HOLDUP

A.D.T

RESEARCH

that leads the industry

From the Grinnell Research Laboratory has come virtually every improvement made in the automatic sprinkler industry. Heads that will open at prescribed temperatures —that resist the attacks of corrosive liquids or gases. Sprinkler systems that operate at temperatures below freezing; that accelerate the flow of water to the heads.

This constant, progressive research is but one of the Seven Standards of Grinnell Fire Protection. The advantages of protection by the research leaders of the industry have influenced most property owners to select Grinnell equipment.

7 STANDARDS OF SUPERIORITY

RESEARCH
ENGINEERING
DIVERSIFICATION
QUALITY OF PRODUCTS
INSTALLATION
RESPONSIBILITY
ACCESSIBILITY

GRINNELL *Automatic Sprinkler*

FIRE PROTECTION

GRINNELL COMPANY

EXECUTIVE OFFICES PROVIDENCE, R. I.

Branch Offices in Principal Cities